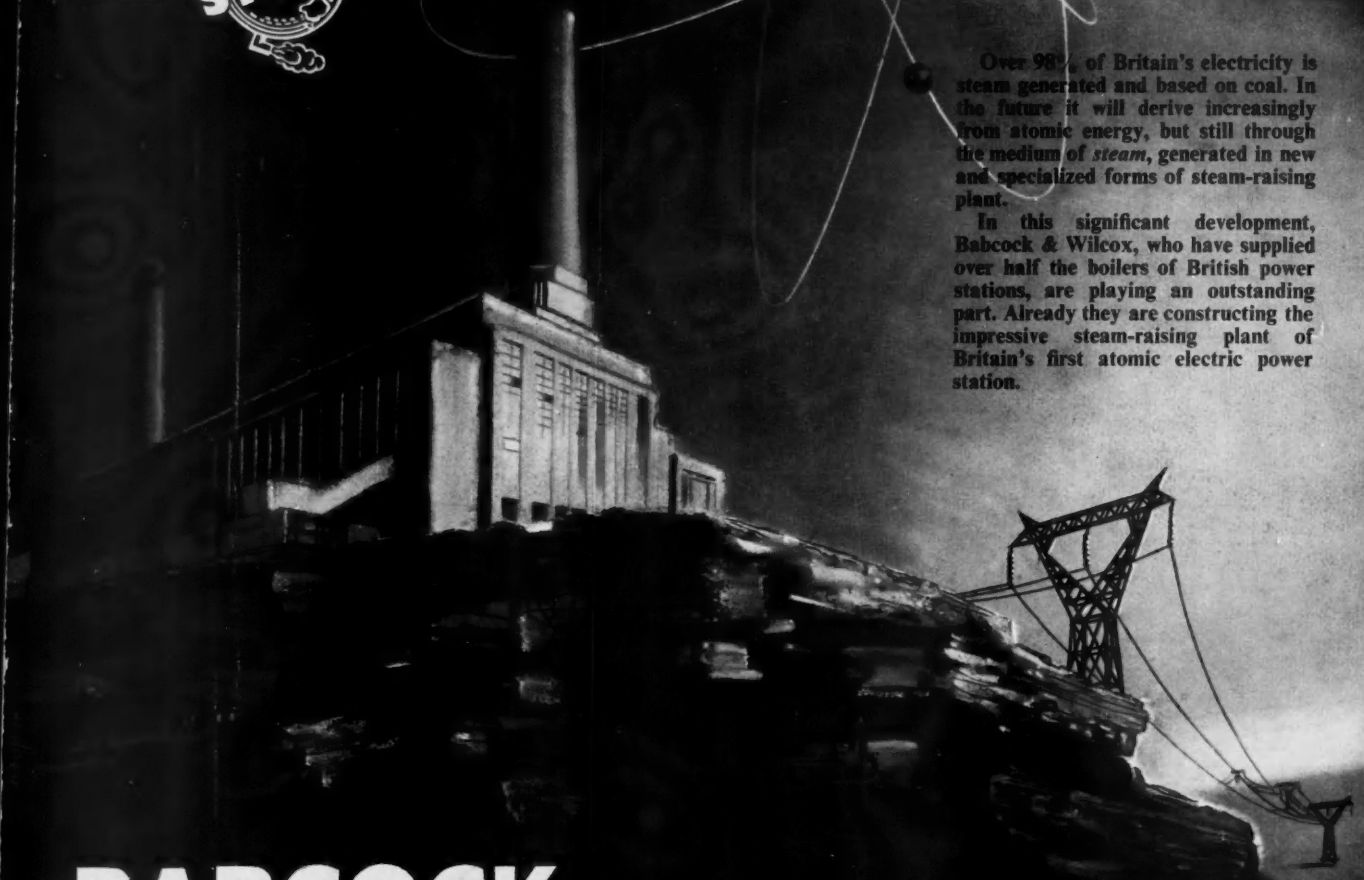
25 SEPTEMBER 1958 NINEPENCE

# ELECTRICAL TIMES


THE GRID DEPENDS ON STEAM

Over 98% of Britain's electricity is steam generated and based on coal. In the future it will derive increasingly from atomic energy, but still through the medium of *steam*, generated in new and specialized forms of steam-raising plant.

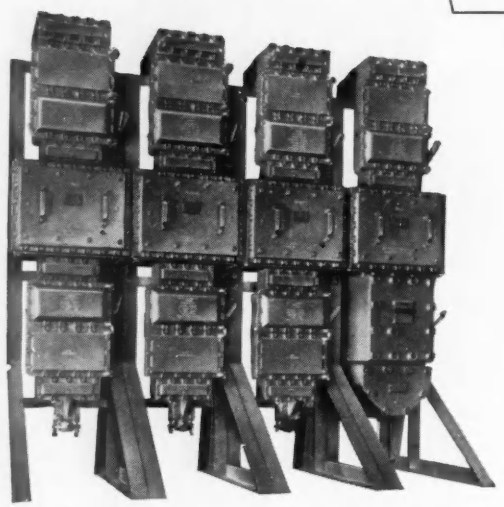
In this significant development, Babcock & Wilcox, who have supplied over half the boilers of British power stations, are playing an outstanding part. Already they are constructing the impressive steam-raising plant of Britain's first atomic electric power station.



BABCOCK STEAM-RAISING PLANT

# Simplex

## Flameproof FLP Equipment



Here is a typical Simplex Flameproof switchgear panel as supplied to oil companies throughout the world. This panel has 300 amp, 500 volt T. P. & N. busbar chambers, 200 amp, 500 volt incoming T. P. & N. switch and seven 60 amp, 500 volt T. P. & N. outgoing switchfuses. This panel was supplied to E. B. Badger & Sons Ltd., of Parkgate Road, Battersea, for the Anglo-Iranian Oil Company's new refinery at Aden

**UNIQUE** — *Supplied to:—*

Aden Protectorate
Arabia
Assam
Australia
Belgium
Burma
Cyprus
England
East Africa
Egypt
France
Germany
Holland
India
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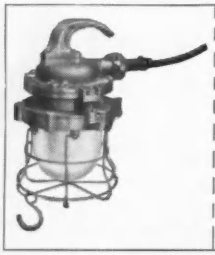
**UBIQUE**

Iran
Iraq
Ireland
Italy
Kuwait
New Zealand
Pakistan
Palestine
Rhodesia
Scotland
South Africa
Sweden
Venezuela
Wales
West Indies



**UNIQUE**

Simplex offer the first and only Flameproof Handlamp (40-60 watt) ever to be granted a full Ministry of Fuel and Power Certificate (No. 3139, covering Groups II and III Gases). The handlamp—which can be supplied ready wired—is designed for use with a special cable and can be wired in conjunction with the Simplex Interlocking Switch Socket and Plug

**UNIQUE**

Simplex 15 amp Interlocking Switch Socket and Plug (AC only) complies with BS.229/46 and CP.1003 and has, of course, been granted a full Ministry of Fuel & Power Certificate (No. 2699 covering Group II Gases). The plug incorporates a special type of clamp allowing the use of screened cables. This prevents the cable being pulled out of the plug

***Advisory Centre*** We will be very pleased to help solve any problems involving Flameproof equipment. Write to our Flameproof Equipment Advisory Centre, Broadwell Works, Oldbury, Birmingham

**flameproof equipment** made by the House of **Simplex**

Simplex Electric Co Ltd Oldbury Birmingham & Branches

A TI COMPANY

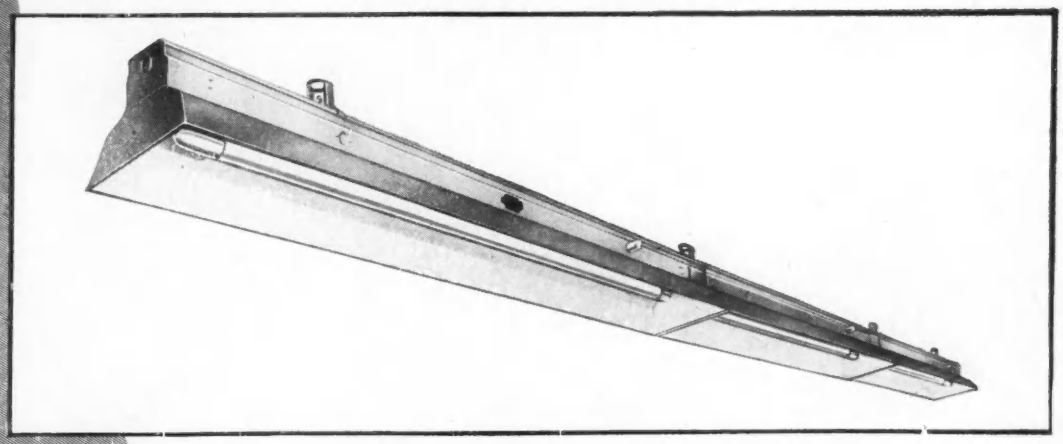
# The NEW Benjamin

## PEROPAL REGD

## FLUROLIER fittings

Regd.

Intensive research has resulted in 'PEROPAL' high temperature stove enamel finish — the finest of its kind on the market. As a new, economical range of Flurolier fittings, 'PEROPAL' is 'first choice' for lighting assembly lines, shoe factories, packing departments . . . for all light industrial schemes. Made in the normal Benjamin Flurolier range, these fittings are 'PEROPAL' finished white inside and out. They have the same varied installation and maintenance facilities such as — Fittings with or without top light — Continuous row mounting — Exclusive lampholder design — Easy detachability of reflector — Wide variety of fixing arrangements — Twin tube circuits. Write for details and illustrated literature.



*Better lighting by*

## BENJAMIN REGD.

**THE BENJAMIN ELECTRIC LTD · TOTTENHAM · LONDON · N.17**

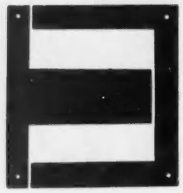
Telephone: Tottenham 5252 (5 lines) Telegrams: "Benjalect, Southtot, London"

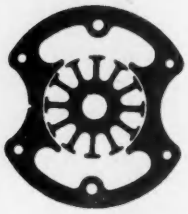
BIRMINGHAM: 5 Corporation Street, Birmingham. 2 Tel: Midland 5197. LEEDS: 49 Basinghall Street, Leeds 1. Tel: Leeds 25579

Smee's 12.54

# LAMINATIONS
## IN BULK PROMPTLY

PROTOTYPES TOO





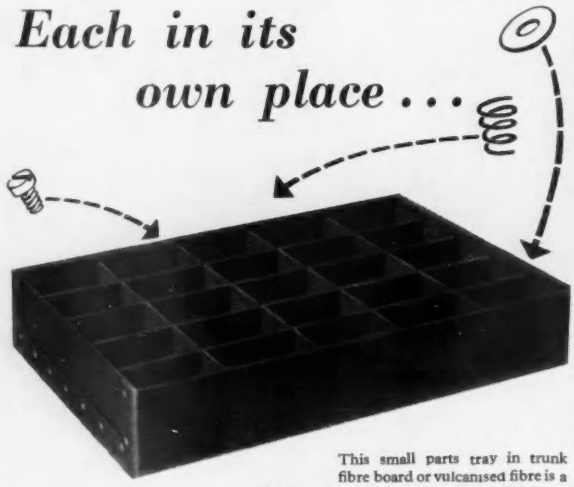
We supply all types of Laminations in bulk promptly. All metals and specifications in most cases immediately available, including High, Medium and Low Silicon Alloys. All Nickel Iron Alloy Lamination heat treatment is guaranteed. We also supply prototypes for all new designs in the shortest possible time that size, type and circumstance permit.
Send us a sample or sketch of your requirements, together with the specification, which will receive immediate attention.

## ELECTRONIC LAMINATIONS

Telephone: Slough 25171 LIMITED Telegrams: Lamination, Slough

OXFORD AVENUE, SLOUGH, BUCKINGHAMSHIRE

*Each in its own place . . .*



This small parts tray in trunk fibre board or vulcanised fibre is a boon to electrical component manufacturers. It can be obtained with fixed or removable partitions to hold variable amounts of small parts. Moreover, where female labour is used the lightness of fibre board for lifting and carrying will be appreciated by its users. The Enfield small parts tray is guaranteed to cut fatigue and muddle—this must result in a definite upward trend in production.

*Fibre Board is STRONGER and LIGHTER*

ENFIELD BOX COMPANY LIMITED

Queensway Enfield Middlesex Phone: Howard 1888 (2 lines)

*make it safe!*

CASTELL LOCKS

Adaptable to Electrical and Mechanical Equipment to ensure correct sequence of operations for protecting both Personnel and Equipment. Padlocks — Special Locks, etc., for all industrial purposes. Locking and interlocking schemes developed and supplied.

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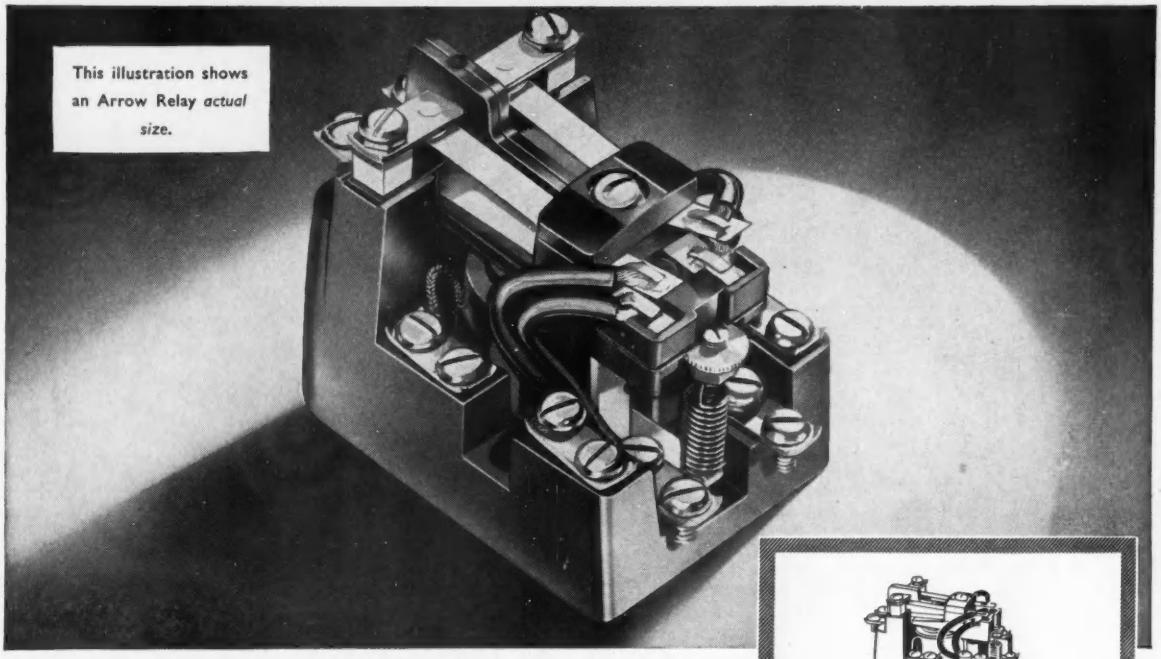
Telephone: MUSeum 2063/4

# RELAYS for LONG AND SILENT SERVICE



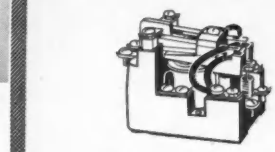
This illustration shows an Arrow Relay *actual size.*

Made by skilled craftsmen from first-quality materials, Arrow Relays, like all Arrow products, are individually produced; they are designed and built to ensure exceptionally long and silent service.

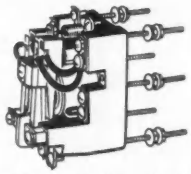
Essentially compact, no less than thirty different circuit arrangements are available on the standard base. Silver-to-silver butt type contacts give continuous rating up to 10 amps per pole at 230 volts AC. Operating coils, of low wattage consumption and continuously rated, are available for 6 to 550 volts AC and 6 to 230 volts DC.

***SEND FOR LEAFLET M.S.820***

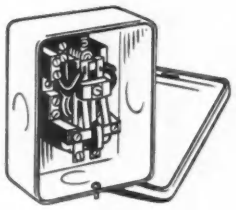
ARROW



1. For surface mounting

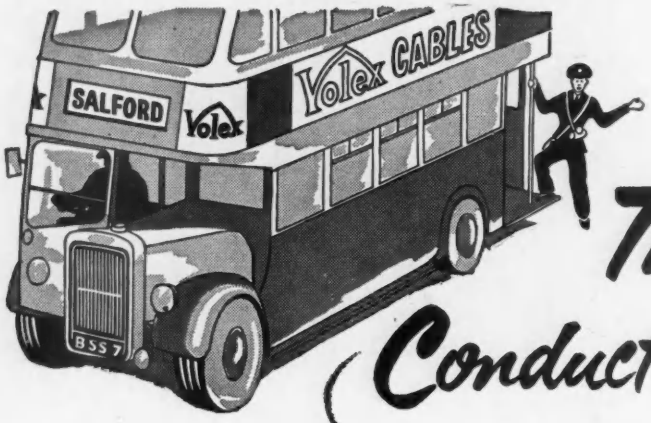


2. For back of panel wiring



3. Enclosed

**ARROW ELECTRIC SWITCHES LTD · HANGER LANE · LONDON · W.5**

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# Volex CABLES

You are certain to be right in using "Volex" Cables. They provide the answer to efficient and dependable electrical wiring installations.

**Manufactured and tested under the strictest technical supervision and complying with appropriate British Standard Specifications.**

For ease of handling and attractive display each type and all sizes are wound on robust multi-coloured reels.

**SEND FOR NEW EDITION CATALOGUE AND PRICE LIST WITH SAMPLES.**

★ **V.I.R. CABLE**
**TAPED, BRAIDED AND COMPOUNDED**
**To B.S.S. 7. 1953 Table 22**

★ **T.R.S. CABLE**
**To B.S.S. 7. 1953 Table 26**

★ **POLYTHENE**
**INSULATED, P.V.C. SHEATHED**

ALL ON REELS

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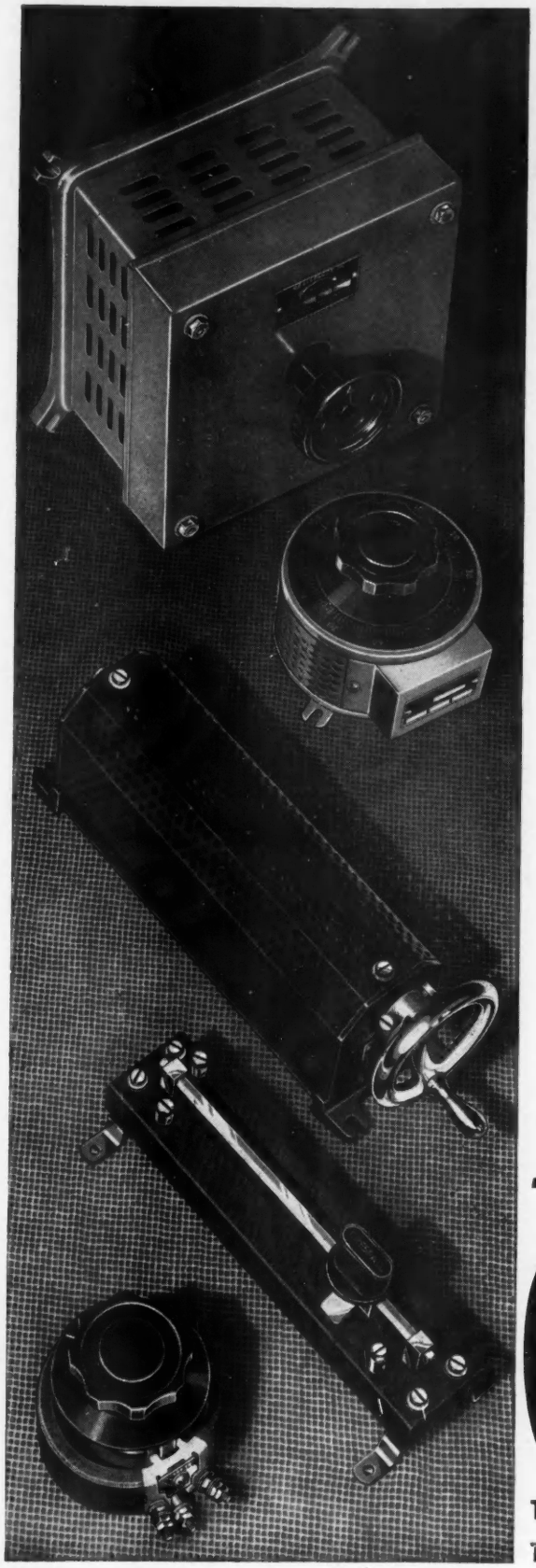
Volex VOLEX ELECTRICAL PRODUCTS LTD
SALFORD 6

Telephone: PENdleton 4373 Telegrams: "VOLEXPROD", Salford 6

C4188



# Think of these...

Asbestos Woven Resistance Grids
Battery Charging Rheostats
Lighting Dimmers
Loading Resistors, Fixed and Variable
Meter Testing Rheostats
Motor Operated Rheostats
Motor Starters, D.C.
Resistors wound on Asbestos, Mica, Mycalex and Porcelain for Radio Communications, Electronics, etc.
Potentiometer Rheostats
Reversing Potentiometer Rheostats
Series Rheostats
• Shunt-field Rheostats
• Slider Type Rheostats, Tubular and Slate-wound
Switches, Radial Multi-stud Pattern
Switches, Straight Line Multi-stud
Transformer Tap Change Switches
• Toroidal Potentiometer Rheostats
Tubular Resistors, Fixed and Tapped
Welding Resistors and Rheostats

* * *

Asbestos Woven Heating Nets
Air Heaters, Electric
Cartridge Heater Units
Heating Elements wound on Mica, Porcelain, Asbestos
Industrial Equipment, Electrically Heated
Steel-jacketed Heater Units

## ...and you think of

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**THE CRESSALL MANUFACTURING CO. LTD.**
**TOWER STREET · BIRMINGHAM 19**

# For easy selling

**Attractively designed, strongly made, reasonably priced and extensively advertised, these six fires will sell like hot cakes when the buying season reaches its peak.**

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Finish: Cream and Black

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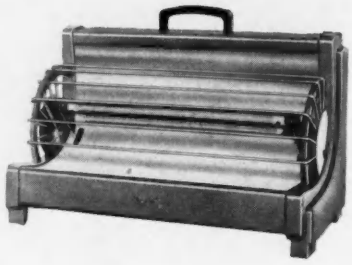
**No. 92A 1½kW size £5.12.9. inc. tax**
**No. 83A 2¼kW size £6.14.0. inc. tax**
Finish: Light Bronze



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**No. 142 2kW size £4.13.0. inc. tax**
Finishes: Silver, Silver Green, Silver Bronze.

**PRINCESS**

**2kW SIZES:**
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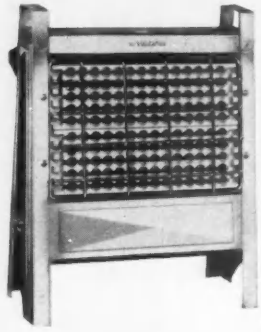
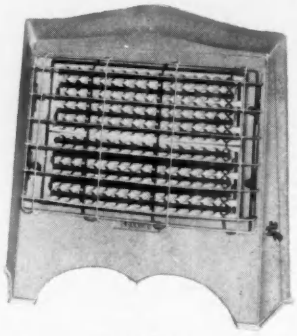
**No. 212A (with logs) £13.18.10. inc. tax**
**3kW SIZES:**
**No. 213 (with coal) £12.11.6. inc. tax**
**No. 213A (with logs) £15.3.5. inc. tax**
Ripple Finishes: Bronze, Silver Green, Silver.



**DINKIE**

**No. 601 1kW size £2.6.6. inc. tax**
**No. 602 2kW size £3.8.4. inc. tax**
Finishes: Silver, Silver Green, Silver Bronze.



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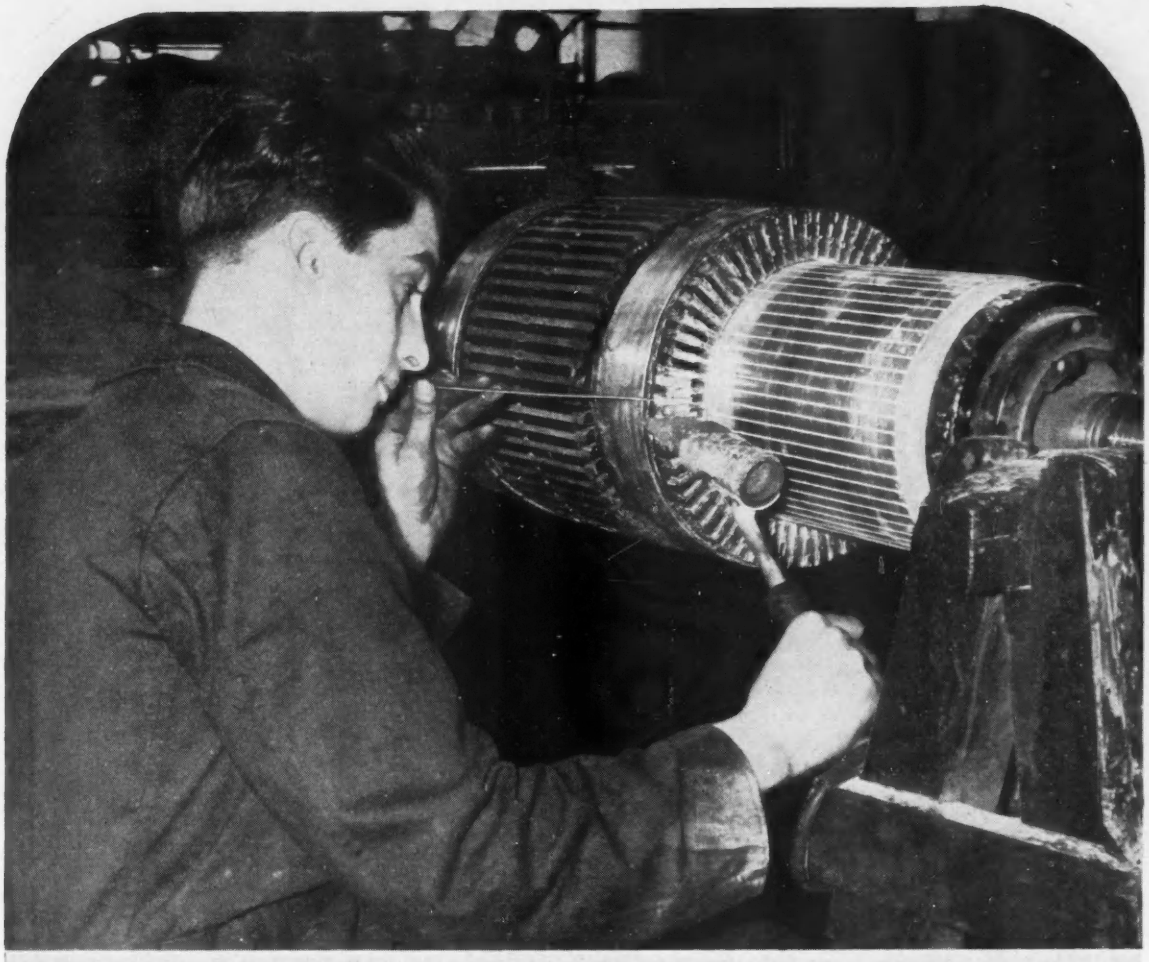

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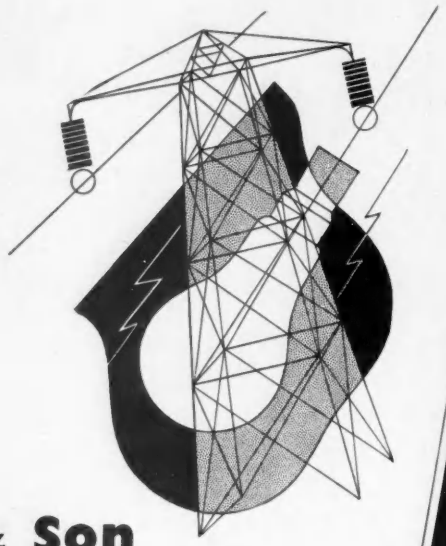

**Books on theory and practice, new developments and applications and other specialized subjects can be quickly supplied through your local Smith's shop or bookstall.**

*Your copies of ELECTRICAL TIMES can be bound into attractive volumes; and all your stationery and printed matter supplied through our local branch.*

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# COXOHM AUTOMATIC VOLTAGE *REGULATOR*

- Suitable for large A.C. or D.C. machines.
- Possesses extreme sensitivity.
- Accurate to within ± 1%.
- Full balancing gives stability under mobile conditions.
- Simple to install and to put into operation.
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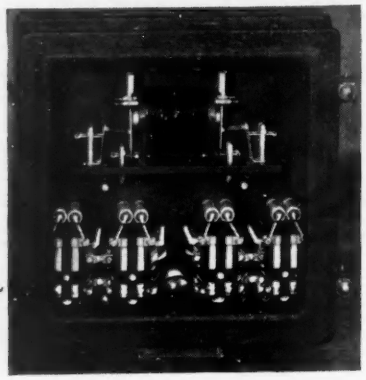
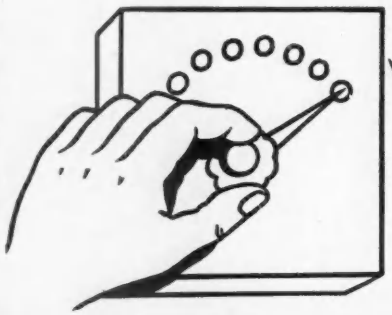


As specialists in the field we shall be pleased to advise on the question of automatic voltage regulation if we may receive particulars of your specific requirements for any loading.



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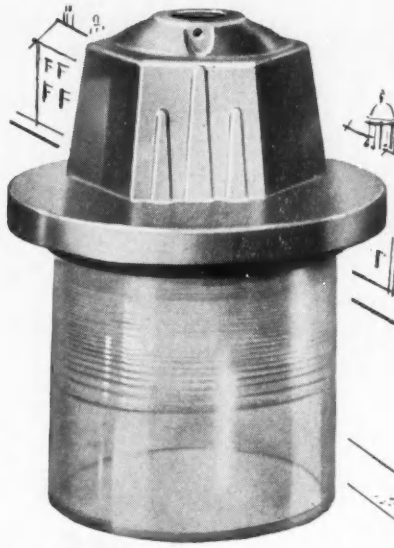
**NORTH EASTERN ELECTRIC WORKS**

*Established 1880* **DARLINGTON** *Phone 2387*

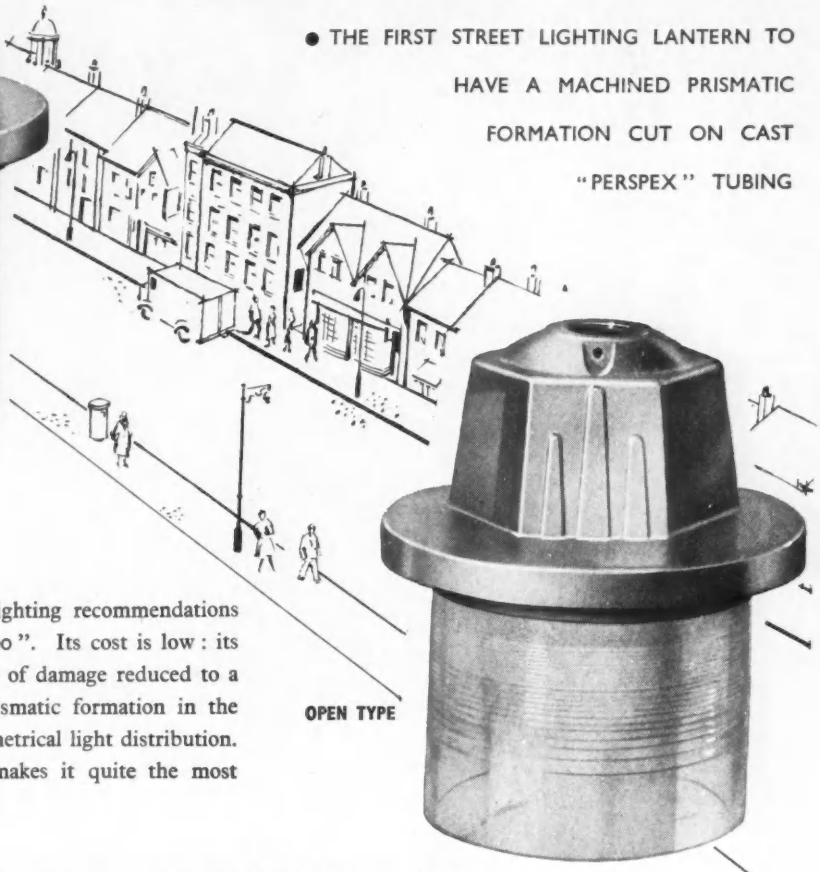
# Brighter streets—at Less cost

## with the 'UNIVERSAL 100' (WATT)



ENCLOSED TYPE

- THE FIRST STREET LIGHTING LANTERN TO HAVE A MACHINED PRISMATIC FORMATION CUT ON CAST "PERSPEX" TUBING

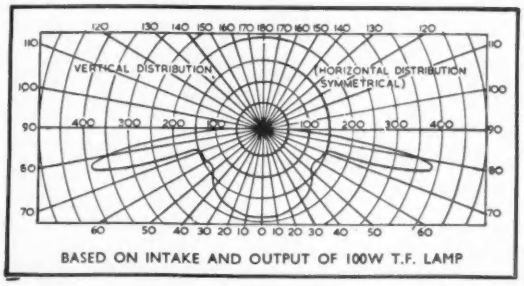


OPEN TYPE

BEFORE deciding on your street lighting recommendations you should see the "Universal 100". Its cost is low: its maintenance easy and the chances of damage reduced to a minimum. The machine cut prismatic formation in the "Perspex" refractor ensures symmetrical light distribution. In fact, its all-round efficiency makes it quite the most attractive proposition available.

### HERE ARE SOME OF ITS OUTSTANDING FEATURES:

- *Die-cast aluminium alloy body casting.*
- *Perspex refractor.*
- *Machined and Polished Prismatic Formation.*
- *Low initial cost.*
- *Less liable to damage.*
- *Easy maintenance.*
- *Adaptable for street lighting.*
- *Doorways.*
- *Stairs.*
- *Alleyways.*




BASED ON INTAKE AND OUTPUT OF 100W T.F. LAMP

For further information or literature write to:

**ELECO ENGINEERING & LIGHTING EQUIPMENT CO. LTD.**

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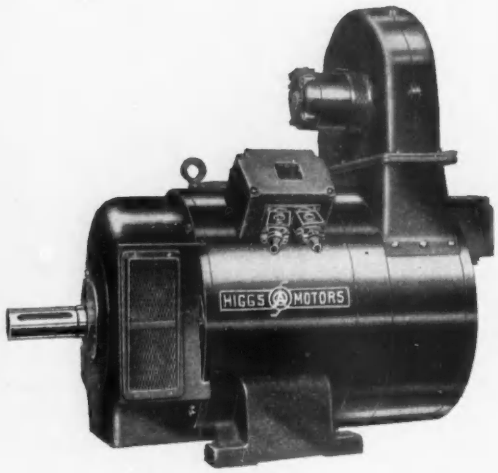
TRADE MARK

HIGGS MOTORS LTD.

CHAIRMAN WALTER F. HIGGS M.I.E.E.

BIRMINGHAM 6 ENGLAND

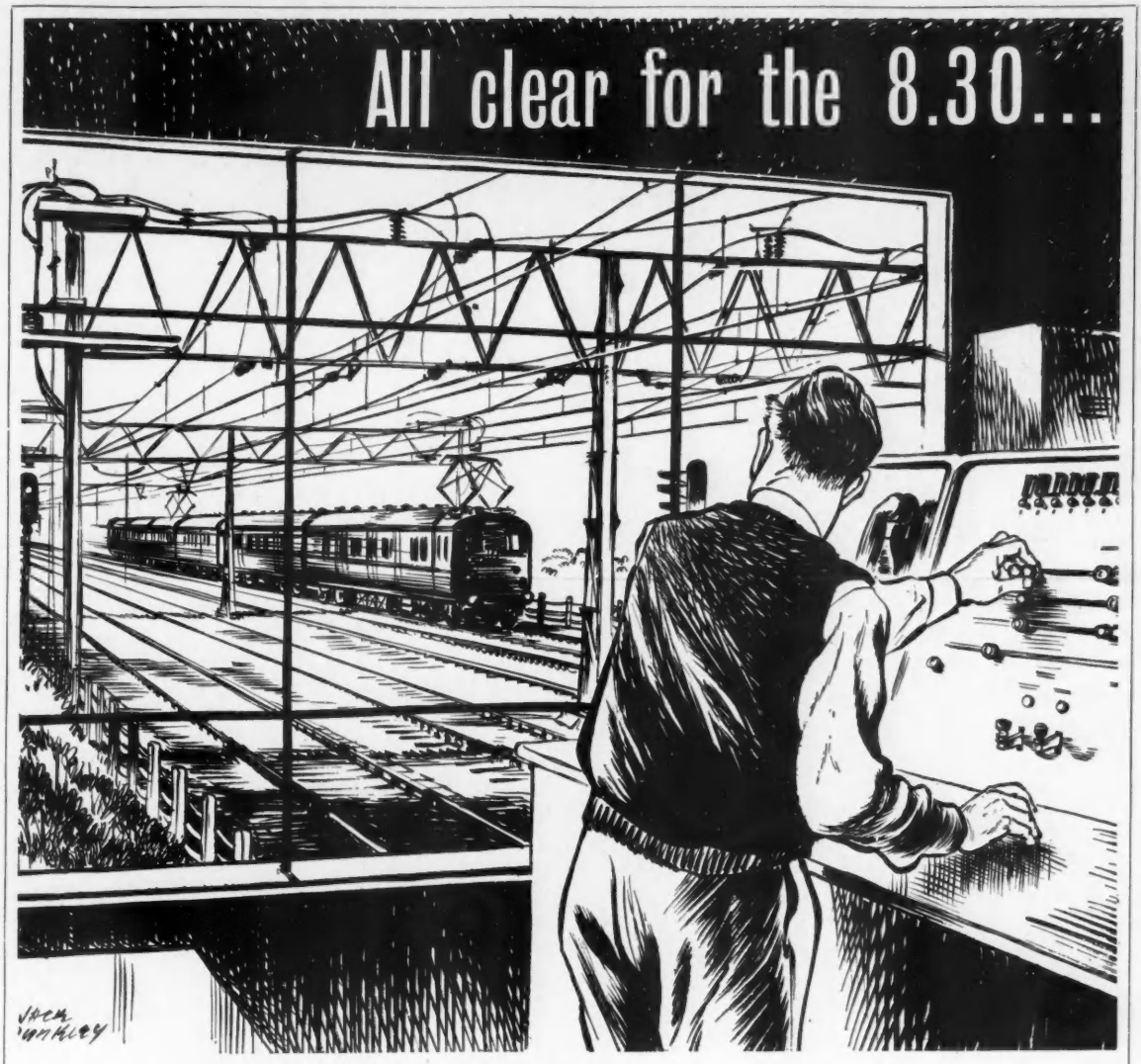



HIGGS VARIABLE-SPEED THREE PHASE MOTORS
for
FINE REGULATION

GUARANTEED FOR EVER

Belfast . Bristol . Cardiff . Dundee . Glasgow . Hull . Leeds . Liverpoo
London . Manchester . Newcastle . Peterborough . Sheffield . Wolverhampton

# All clear for the 8.30...



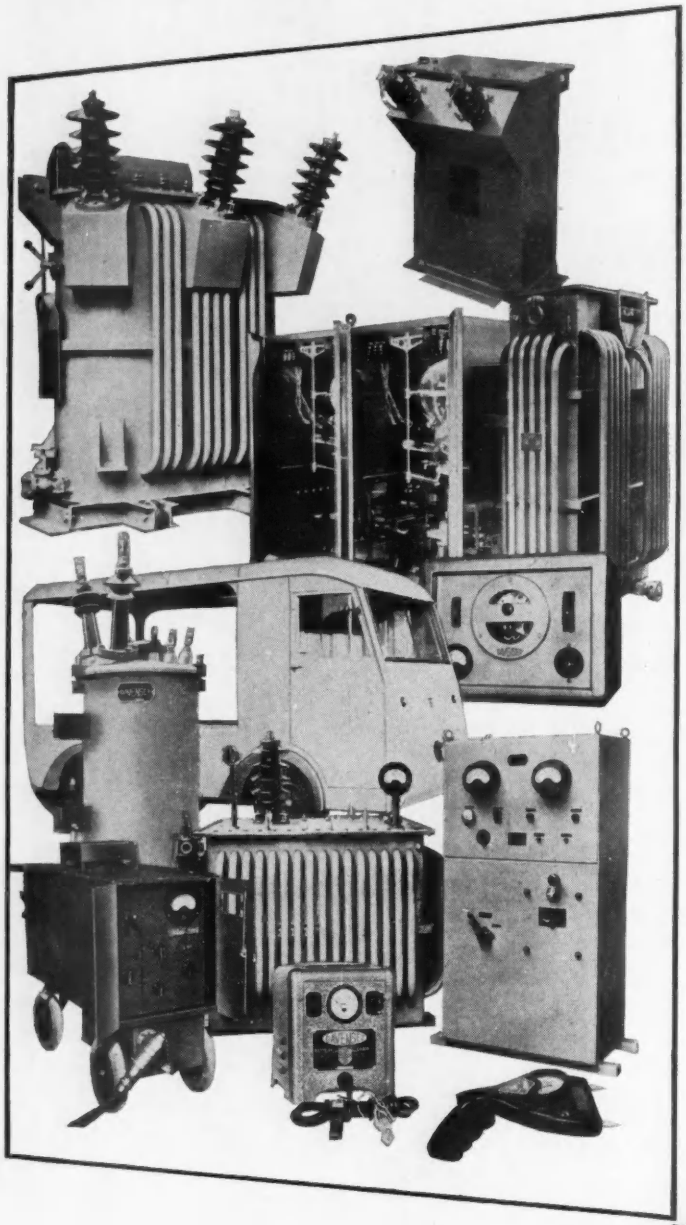
Wherever trains run, electricity plays a part . . . electric traction systems rely on faultless cables . . . and steam trains too depend on cables for automatic signalling . . . cables which have been specially developed by members of the Cable Makers Association.

*By close technical collaboration among its members, the C.M.A. has pioneered the most important developments in electric cable making. That same collaboration makes possible the exceptionally high standards for all types of C.M.A. cable—and safeguards every user.*

SPECIFY **C·M·A** CABLES

*The 'Roman Warrior' and letters 'C.M.A.' are British Registered Certification Trade Marks*

CABLE MAKERS ASSOCIATION, 52/54 HIGH HOLBORN, LONDON, W.C.I



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**electric vehicles**

DAVENSET—a name on which you can rely; products that will never let you down.

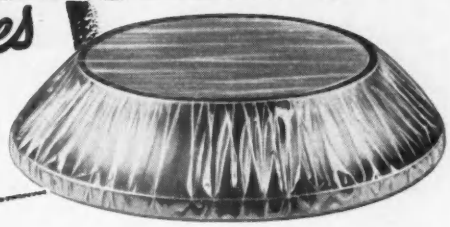
DAVENSET

**PARTRIDGE WILSON & CO. LTD.**

DAVENSET ELECTRICAL WORKS · LEICESTER

# R.E.A.L.

## This NEW presentation makes PLINTH LIGHT selling still easier!



## AND NOW—THE PERFECT WRAP!

Moisture proof and dust proof, this pleated Cellophane wrap permits full inspection and handling by the potential customer, the final purchaser receiving the Plinth in its immaculate, factory fresh condition.

## ALSO—THE PERFECT PACK!

Free Rail Certified Containers, holding 12 Plinths of a size, are now the standard method of dispatch. Each pack carries a schedule of colour content. When opened, the sealed transparent wrap gives immediate view of the colour assortment. An analysis of sales over the past four years, shows that the public demand, per dozen, is divided in the following proportions:—6 Pastel Cream, 2 Gilt Lustre, 2 Eggshell Black, 1 Pastel Rose and 1 Pastel Blue. This, therefore, is our standard colour selection—but, of course, any colour assortment can be supplied. Broken quantities carriage extra, plus part cost of packing.

***Thousands of private purchasers write to us annually asking where they can buy a R.E.A.L. Plinth. As most Plinths are distributed by one or other of our authorised Wholesalers, we find these enquiries not only embarrassing, but expensive! R.E.A.L. is not a departmental store with a mail order section. We have done the spadework—WHY NOT JOIN WITH US IN REAPING THE HARVEST?***

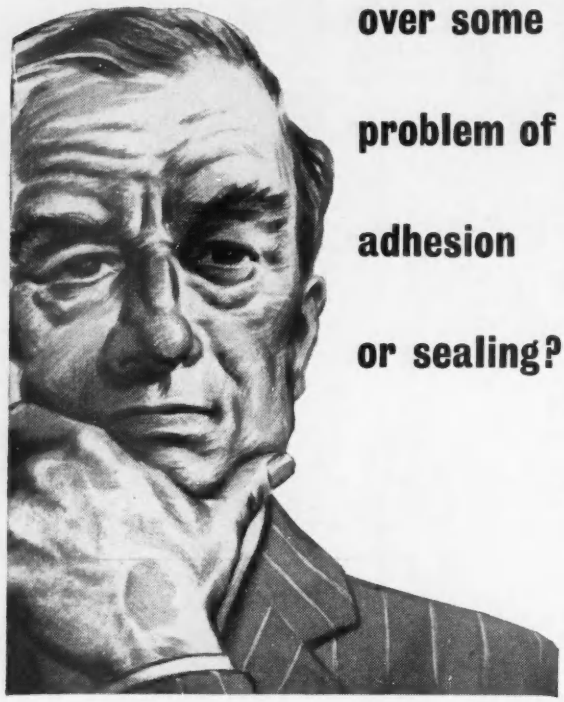
R.E.A.L. Plinth Light Pat. No. 659876

## —and ample counter publicity too!

*Attractive showcards, leaflets and price tickets are provided with each pack.*

Issued by ROWLANDS ELECTRICAL ACCESSORIES LTD., R.E.A.L. WORKS, BIRMINGHAM, 18

# Who has a headache



over some problem of adhesion or sealing?

There are problems of adhesion and sealing peculiar to the electrical industry. For example, weather-proofing electrical components so that they are absolutely water-tight and oil-resistant—and we do mean *absolutely*. Don't keep these problems to yourself when all the time there might be just the grade of BOSTIK Adhesive or PRESTIK Sealing Strip to save the day. Write to us. Tell us everything you feel we should know. Then leave the rest to us. We have a technical representative in your area who will visit you at short notice on request.

**100 to 1 the remedy is**

# Bostik

**ADHESIVES & SEALING COMPOUNDS**

PRESTIK SEALING STRIP

*'Bostik' is the registered trademark of*
**B. B. CHEMICAL CO. LTD., Ulverscroft Road, Leicester,** *to whom all enquiries should be addressed.*



# FOCUS ON INDUSTRY

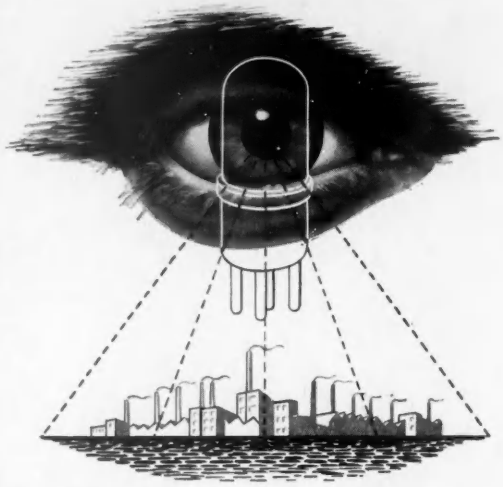


Photo-electric controls are the eyes of industry—measuring, indicating, counting, batching, protecting; performing a hundred-and-one mechanised jobs with automatic regularity.

For many years, photo-electric control of mechanical operations has proved an unfailing aid to economy and productivity in industrial plants and offices throughout the world. Radiovisor, established in 1927, have had the widest experience in this field and justly claim to be the "First Name in Photo-Electric Controls".

RADIOVISOR
EST. 1927

THE FIRST NAME IN PHOTO-ELECTRIC CONTROLS

## PHOTO-ELECTRIC CONTROLS

*INCLUDE:*

**FLAMESTAT FLAME FAILURE CONTROL**
**HOPPER & BUNKER LEVEL CONTROL**
**PHOTO-ELECTRIC RELAY • COUNTING & BATCHING UNIT**
**SMOKE ALARM • PRINT REGISTRATION**
**PHOTO-ELECTRIC SAFETY GUARD • TURBIDITY EQUIPMENT**
**FACTORY LIGHTING CONTROL • AUTOMATIC DOOR OPENING**
**INVISIBLE RAY BURGLAR ALARM**
**AUTOMATIC RADIATION PYROSTAT**

*Full particulars from:*

**RADIOVISOR PARENT LTD**
**1 STANHOPE STREET, LONDON, N.W.1**
**Tel: EUSton 5905/6**

# Simplicity—The Hallmark of Genius....

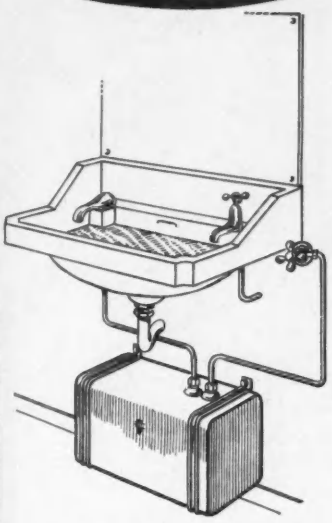
**Heatrae** *electric water heaters are so simple....*

- Top and bottom fixing provides greater ease in fixing and a neater assembly.
- External Terminal Box for easy wiring. The ordinary V.I.R. cables terminate in a cool position.
- Instantly removable core-heating element.
- High-precision thermostat.
- Specially suitable for "Hard Water" districts.
- Easily adapted for overhead or underneath service—as shown.

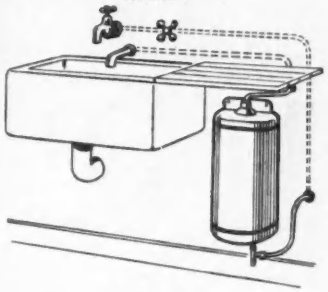
***so simple to install***

***so simple to maintain***

*Ask us for Leaflet DE D*



Also meet the **U.B. Type Water Heater,** made in 2-gallon size; automatically controlled; specially designed for use where no space is available above the sink or basin. Special fittings provided for convenience in connecting up these heaters.

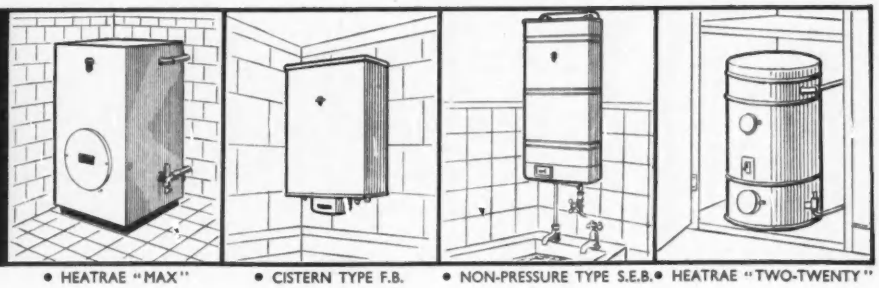


Here is shown how the Heatrae "DOT" can be fitted below the sink or wash basin. The "DOT" can be applied in several different ways to best suit local arrangements.

**Meet the "DOT"!**

. . . the dependable, economical and safe Electric Water Heater, which, with its flat back and minimum projection, "fits in" any odd corner.

30 years specialised experience in designing and manufacturing of Electric Water Heaters



• HEATRAE "MAX" • CISTERN TYPE F.B. • NON-PRESSURE TYPE S.E.B. • HEATRAE "TWO-TWENTY"

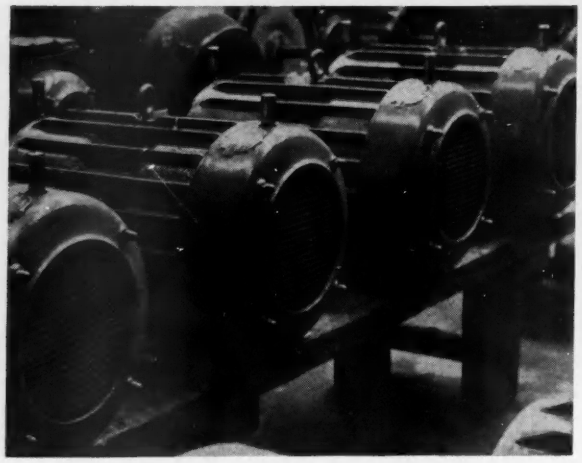
**Advertisement issued by HEATRAE LTD · NORWICH · ENGLAND**

*Manufacturers of: Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Flameproof Heating Apparatus, Breakfast Cookers, Electric Fires, Food Trolleys, Warming Plates, Air Heaters*

# BRITISH-MADE
# SILICONES
## *in the service of the*
## ELECTRICAL INDUSTRY
## A NEW *class of* INSULATION

Part of an export consignment of twenty-five motors for Canada, for which silicone (Class H) insulation was specified, in order to ensure longer life and greater reliability under arduous conditions.

Wherever motors, transformers, magnet or heating coils operate in difficult conditions of high ambient temperature, high humidity, overload or chemical or oil contamination, silicones are the answer to insulation breakdown problems. Silicone insulants include resins and rubbers which, in combination with mica, glasscloth or asbestos form a completely new class of insulation. In heavy and light electrical engineering or electronics silicone insulants provide a safety factor against insulation breakdown not previously attainable.



*(Photographs by courtesy of Lancashire Dynamo and Crypto Ltd.)*

A complete range of silicone insulation components is available from insulation manufacturers. Silicone impregnating varnish and other silicones can be obtained direct from:

# MIDLAND SILICONES LTD
*(an associate company of ALBRIGHT & WILSON Ltd.)*

**first** *in British Silicones*

*Ask for Silicone Notes:—*
C17 *Silicones in Motor Windings*
C24 *Silicones in Transformer Windings*
C1 *Varnishes*
C19 *Insulation Component Suppliers List.*

MS 19 UPPER BROOK STREET · LONDON · W.1 · TELEPHONE: GROSVENOR 4551
TBW/MS35

AWCO

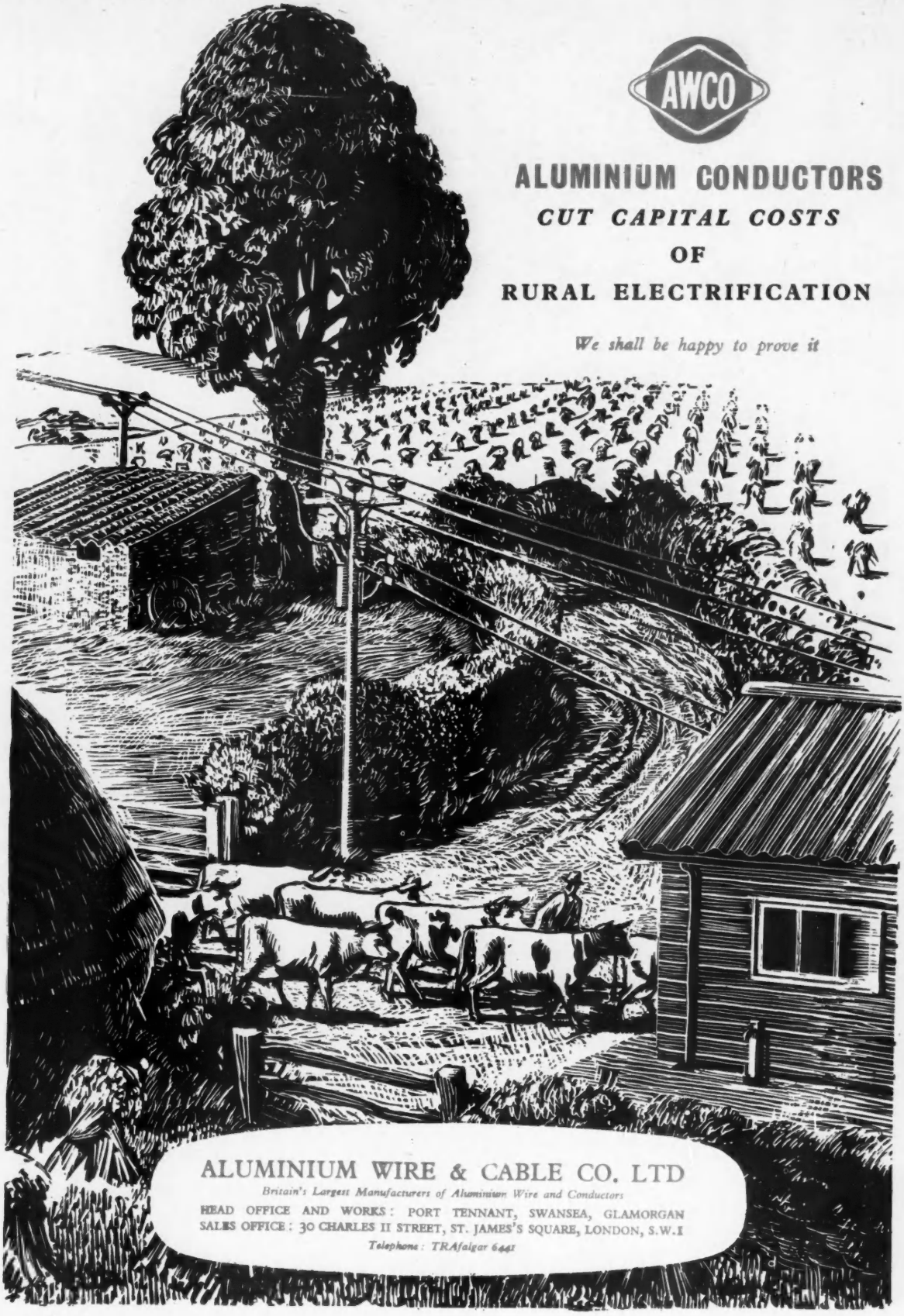
# ALUMINIUM CONDUCTORS

## *CUT CAPITAL COSTS*

## OF

## RURAL ELECTRIFICATION

*We shall be happy to prove it*



ALUMINIUM WIRE & CABLE CO. LTD

*Britain's Largest Manufacturers of Aluminium Wire and Conductors*

HEAD OFFICE AND WORKS: PORT TENNANT, SWANSEA, GLAMORGAN

SALES OFFICE: 30 CHARLES II STREET, ST. JAMES'S SQUARE, LONDON, S.W.1

*Telephone: TRAfalgar 6441*

*When it's a question of*

# I·N·S·U·L·A·T·I·O·N

## ask for "ASHLAM" Laminates

**"ASHLAM"** Laminates are produced from paper, cotton fabric and fibreglass base materials. The fibreglass grades are bonded with Silicone, Melamine, Phenolic and Polyester type resins, and have very high dielectric and insulation properties.

**"ASHLAM"** Laminates are also available in the form of tubes with fibreglass base bonded with Polyester and Silicone resins.

# ask Ashdowns

**A S H D O W N S L I M I T E D**

ECCLESTON WORKS, ST. HELENS, LANCASHIRE. TELEPHONE: ST. HELENS 3206

*Ashdowns Limited is a subsidiary of Pilkington Brothers Limited. "ASHLAM" is the registered trade mark of Ashdowns Limited.*

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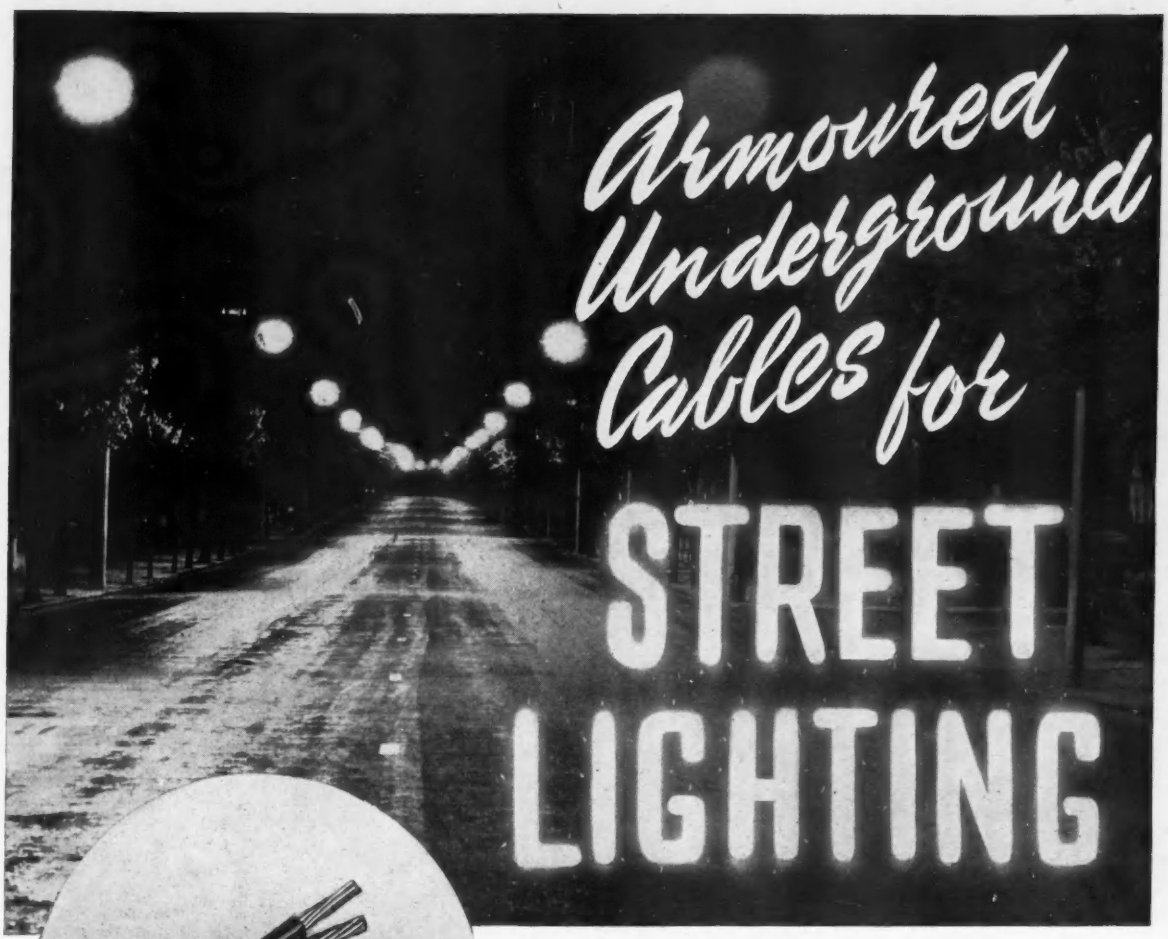
Illustrated is our Medium Size Rotary Ratchet Drive Five Figure Counter with reset. Details of this and other models are given in our leaflet No. 1.

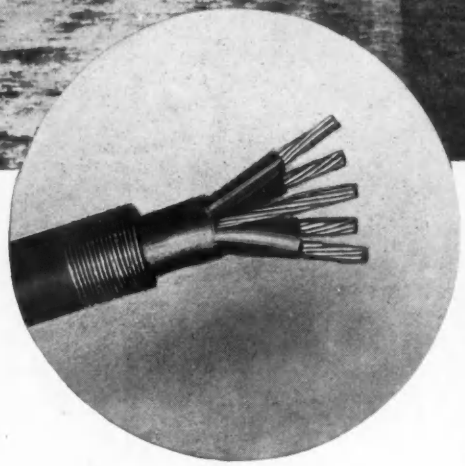
**COUNTING INSTRUMENTS LTD.**

5, ELSTREE WAY, BOREHAM WOOD, HERTFORDSHIRE

*Telephone:* ELSTREE 1382-3-4 *Cables:* COUNTHOR, BOREHAMWOOD



# Armoured Underground Cables for STREET LIGHTING



*Send for Catalogue and Leaflets*

## CABLE of Quality

MANUFACTURED UNDER THE SUPERVISION OF EXPERTS OF LONG STANDING IN THE INDUSTRY

**WANDLESIDE CABLE WORKS LTD.**

106 Garratt Lane, Wandsworth, London, S.W.18

*Telephone:* *BATtersea 2273 (5 lines)*

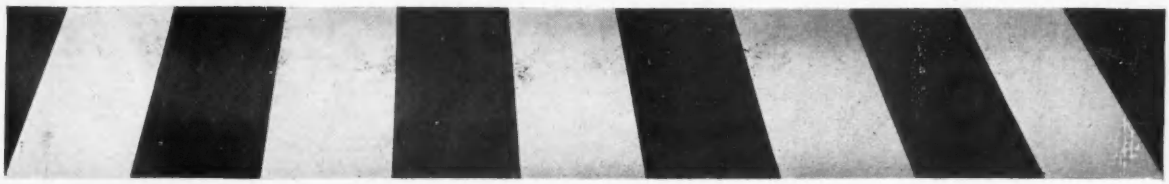
*Telegrams:* *"Wandleside, London"*

London Office and Stores: 30, Tottenham Street, W.1

*Telephone: LANgham 8317*

One of the FALKS GROUP

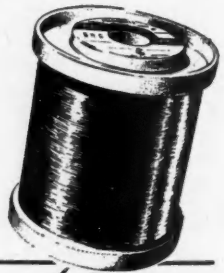
NOW ALSO BEING USED FOR ILLUMINATING **ZEBRA CROSSINGS**



# Send for Yours To-day . . .

Connollys have produced five handy "slide rule" tables which give, at a glance, considerable data not normally available in ready form, concerning winding wires as follows:

| | | | | | |
|---|---|---|---|---|---|
| **Enamel Normal** | **"Oleo Resinous"** | | | **to B.S.S.** | **156/1951** |
| **Conymel F** | **"Vinyl Acetal"** | | | **to B.S.S.** | **1844/1952** |
| **Conymel M** | **"** | **"** | **"** | **"** | **"** |
| **Conymel T** | **"** | **"** | **"** | **"** | **"** |
| **Conymel X** | **"** | **"** | **"** | **"** | **"** |



We shall be pleased to mail you one or more sets, if you will kindly write us on your business letterheading.

**CONNOLLYS** *Winding Wires*

*The largest manufacturers of fine enamelled wires in the world*

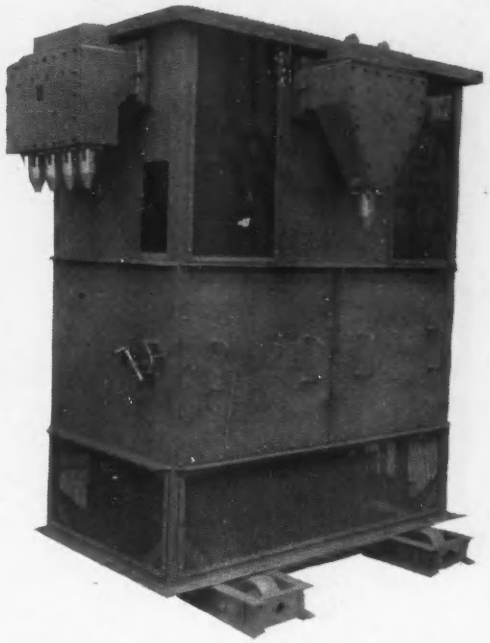
**CONNOLLYS (BLACKLEY) LIMITED., Kirkby Industrial Estate, Liverpool**

Telephone: SIMonswood 2664 Telegrams: "SYLLONOC, LIVERPOOL"

*Branch Sales Offices:*

**SOUTHERN: 34, Norfolk Street, Strand, London, W.C.2. TEMple Bar 5536.**

**MIDLANDS: 15/17, Spiceal Street, Birmingham. MIDland 2258.**



A 500kVA, 11kV, T.W. Distribution Transformer, Dry Type Air Cooled with All Silicone Impregnated Insulation

FOR UNDERGROUND AND BASEMENT SUBSTATIONS

INSTALL

T.W. ALL SILICONE IMPREGNATED DRY-TYPE AIR-COOLED TRANSFORMERS

USING ONLY CLASS H INSULATION

# NO FIRE RISK

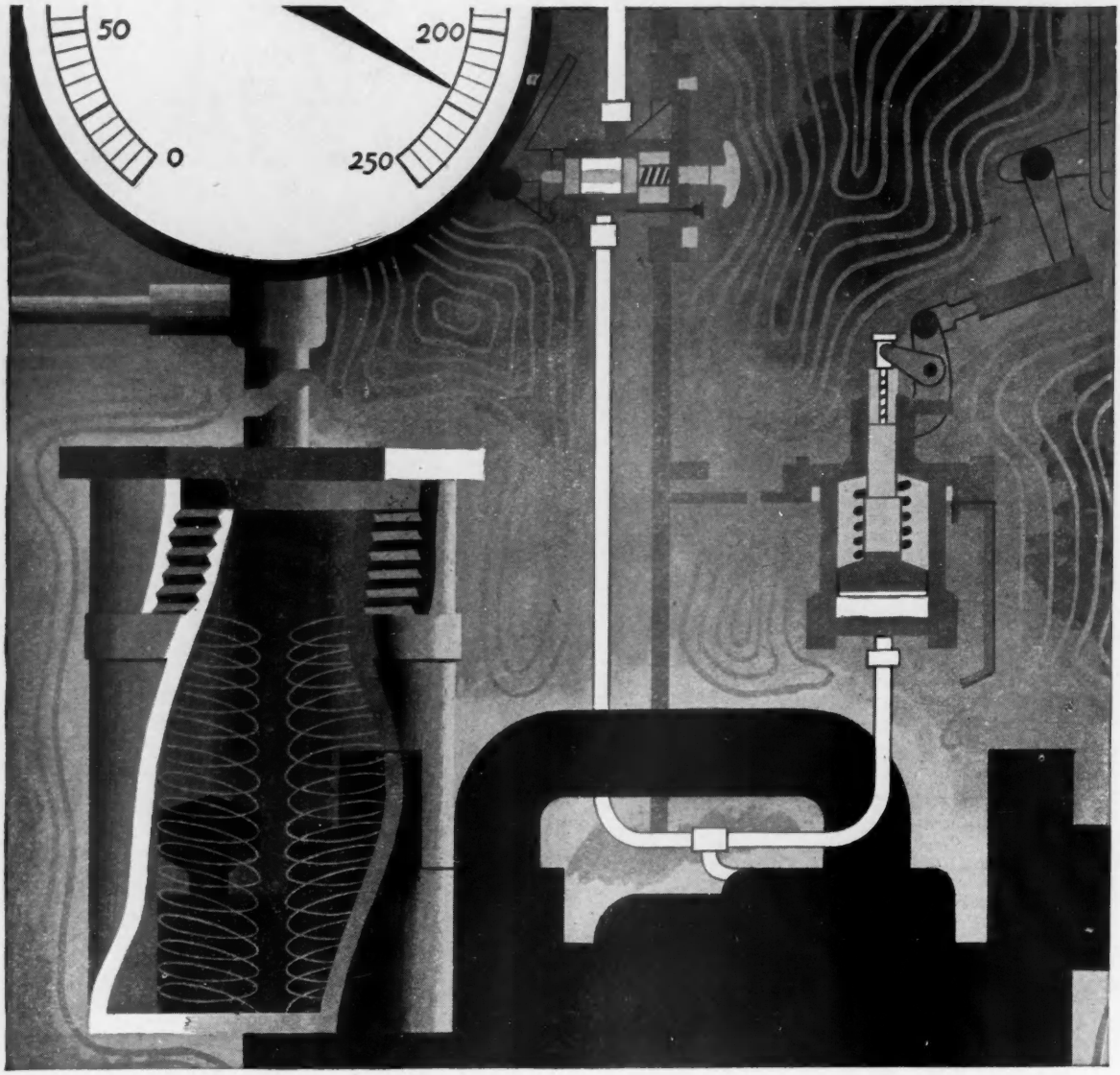
*Special Features:—*

1) Smaller in size and weight than O.N. units.
2) No fire risk.
3) Greater overload capacity.
4) Less maintenance.
5) Dust, humidity, and ventilation no problem.

*Full details from:—*

TRANSFORMERS (Watford) LIMITED

Sandown Road, Watford, Herts




# Inhibited for life

Where there's a turbine there must be oil—special oil circulating continuously through bearings and gears. If the turbine is to produce its full quota of electrical energy throughout its life, this oil must do a number of vital jobs.

It must lubricate of course. It must also cool, prevent corrosion, and act as the hydraulic medium in governors, overspeed trips and emergency gear. To do all these things without deterioration a turbine oil must have high resistance to oxidation and good demulsibility, and possess rust preventive properties of a high order.

Shell's answer to the problem is a range of specially selected and refined turbine oils—the Shell Turbo Oils. These contain inhibitors which counteract the effects of water and oxygen throughout the life of the turbine.

Acidity—another enemy—is countered, in many large turbine sets that are Shell-lubricated, by acidity tests at regular intervals. The readings are plotted on a graph kept by Shell as a continuous record of the oil's condition.

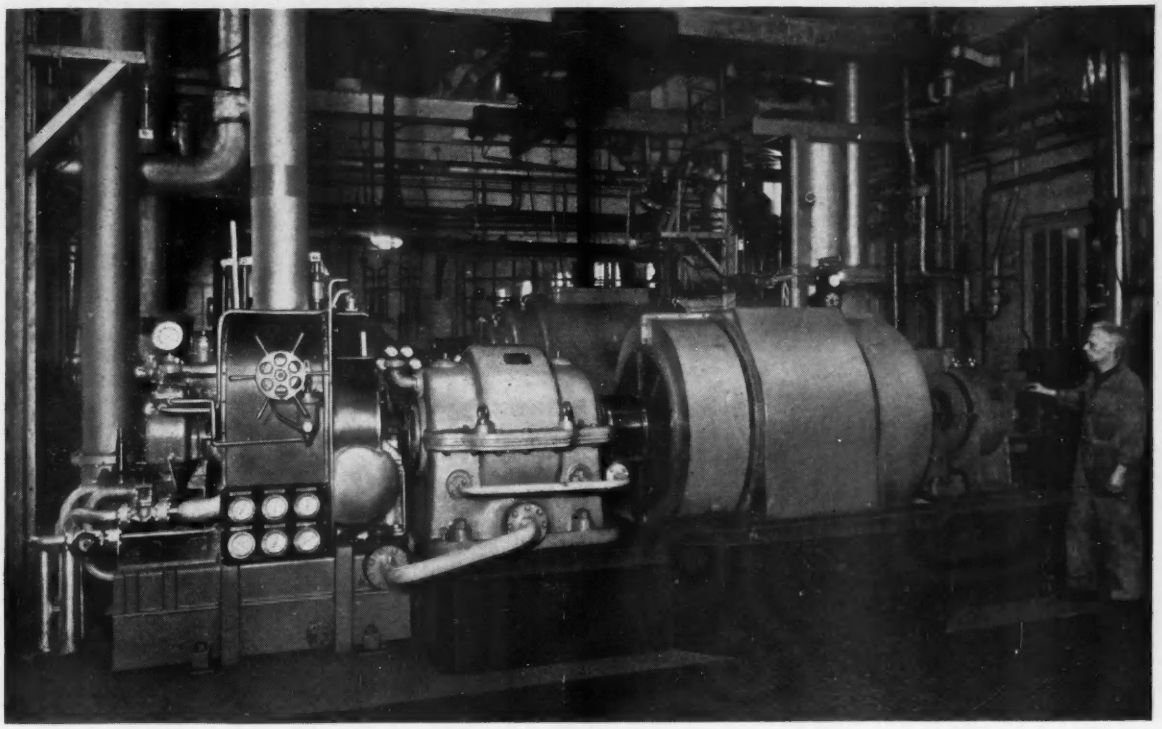
Shell inhibited turbine oils will function efficiently under the severest conditions for the longest possible period—the life of the initial charge is measured in decades. They will do this because they are the product of continuous and comprehensive research, closely geared to progress in turbine design. Even now, Shell experts are experimenting to produce better oils for the turbine of tomorrow.

Shell's laboratories at Thornton, Cheshire, cover an area of 800,000 sq. ft. and are manned by a staff of over 800—that's how Shell makes sure.

SHELL

**LEADERSHIP IN LUBRICATION**

# Small Back Pressure Turbines



## —and Fuel Economy

The photograph shows one of two 1,250 kW geared back pressure turbo-generators installed in the power house of the Trafford Park works of Metropolitan-Vickers providing steam for factory heating and processes at the minimum fuel cost. Similar machines varying from 100 kW to 2,000 kW are in service in various industries.

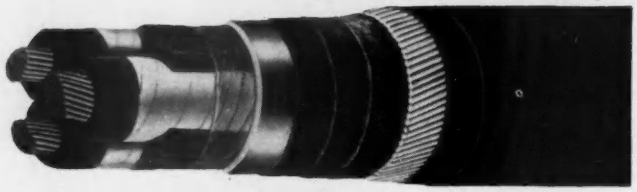
Larger direct-coupled back pressure turbo-generators with outputs up to 30,000 kW, and for the highest initial steam conditions in commercial use, have been manufactured for industrial undertakings requiring large quantities of low or medium pressure steam at the highest overall economy.

*Write for descriptive leaflet No. 444/2-1*

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER 17

B/L401

*Member of the A.E.I. group of companies*



33 kV SOLID TYPE CABLE

**BICC**

make

*EVERY*

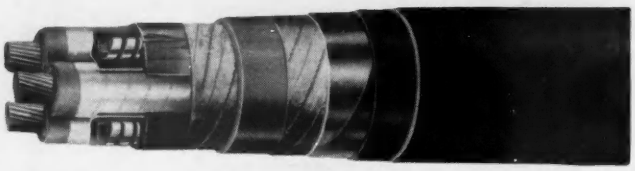
type

of

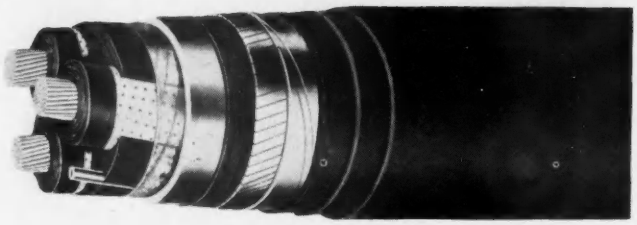
**HIGH**

**VOLTAGE**

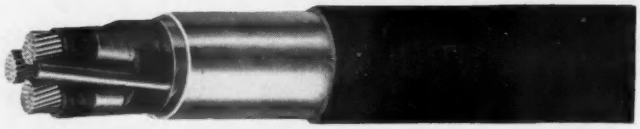
cable



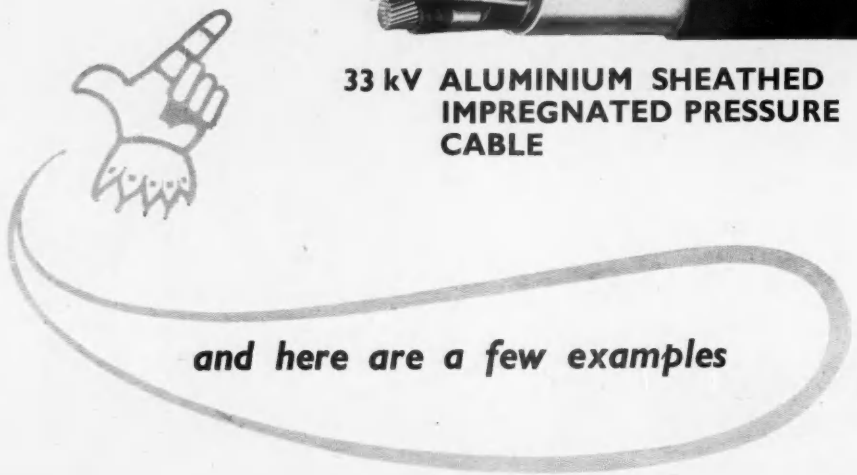
66 kV OIL-FILLED CABLE



132 kV IMPREGNATED PRESSURE CABLE



33 kV ALUMINIUM SHEATHED IMPREGNATED PRESSURE CABLE



*and here are a few examples*

BRITISH INSULATED CALLENDER'S CABLES LIMITED
21 BLOOMSBURY STREET, LONDON, W.C.1

# protective relays

**PROTECTIVE AND CONTROL RELAYS FOR A.C. AND D.C.**
**SEPARATELY ENERGIZED RELAYS.**
**INDICATING AND SIGNALLING RELAYS.**

*Features common to all ASEA Relays are :*

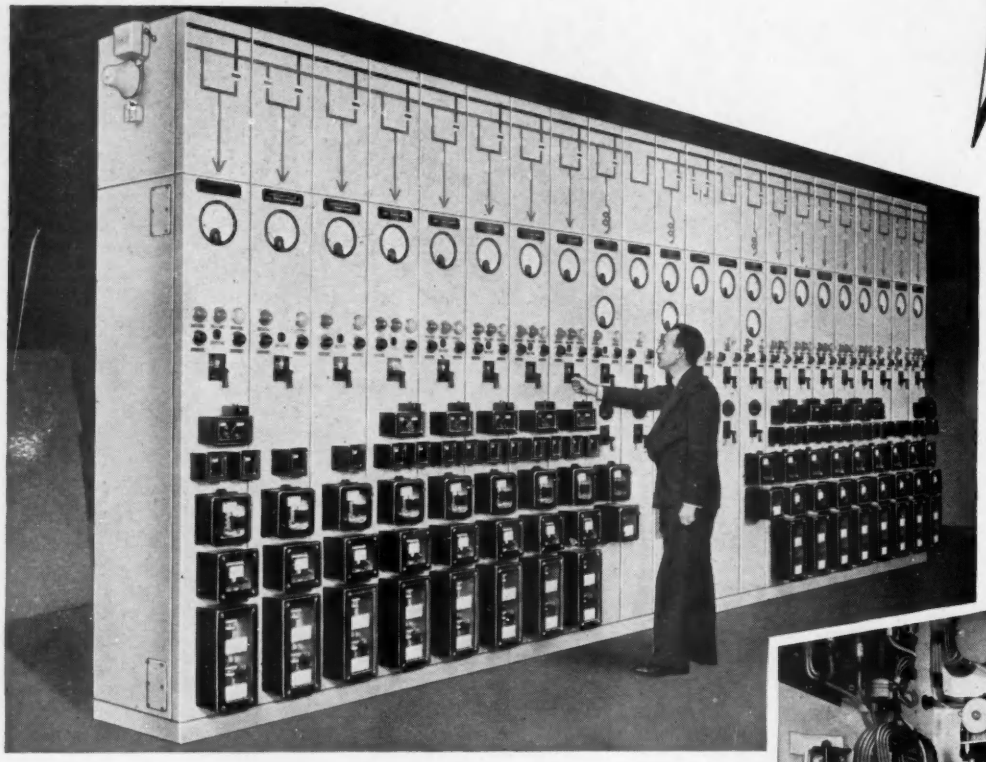
1. Robust design.
2. High short-circuit strength of coils.
3. High degree of sensitivity.
4. Distinct contact movement (not creeping contact) providing large make and break capacity.
5. Low contact resistance.
6. High setting precision and distinct setting scales.
7. Uniformity of design simplifying planning and fitting of relay installations.
8. Neat appearance.

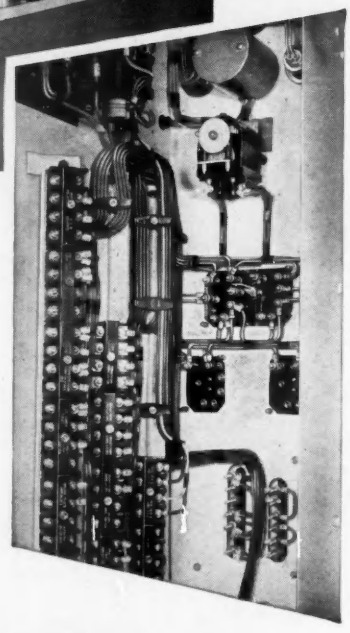
**Consult ASEA about your relay installation project.**

**ASEA**

ASEA ELECTRIC LTD
*Associated with Fuller Electrical and Manufacturing Co. Ltd.*
FULBOURNE ROAD · WALTHAMSTOW · LONDON · E.17
*Phone Larkswood 2350 (10 Lines)*
Also at: BIRMINGHAM · GLASGOW · MANCHESTER · DUBLIN

# Control Boards
## .. for Switchgear Control

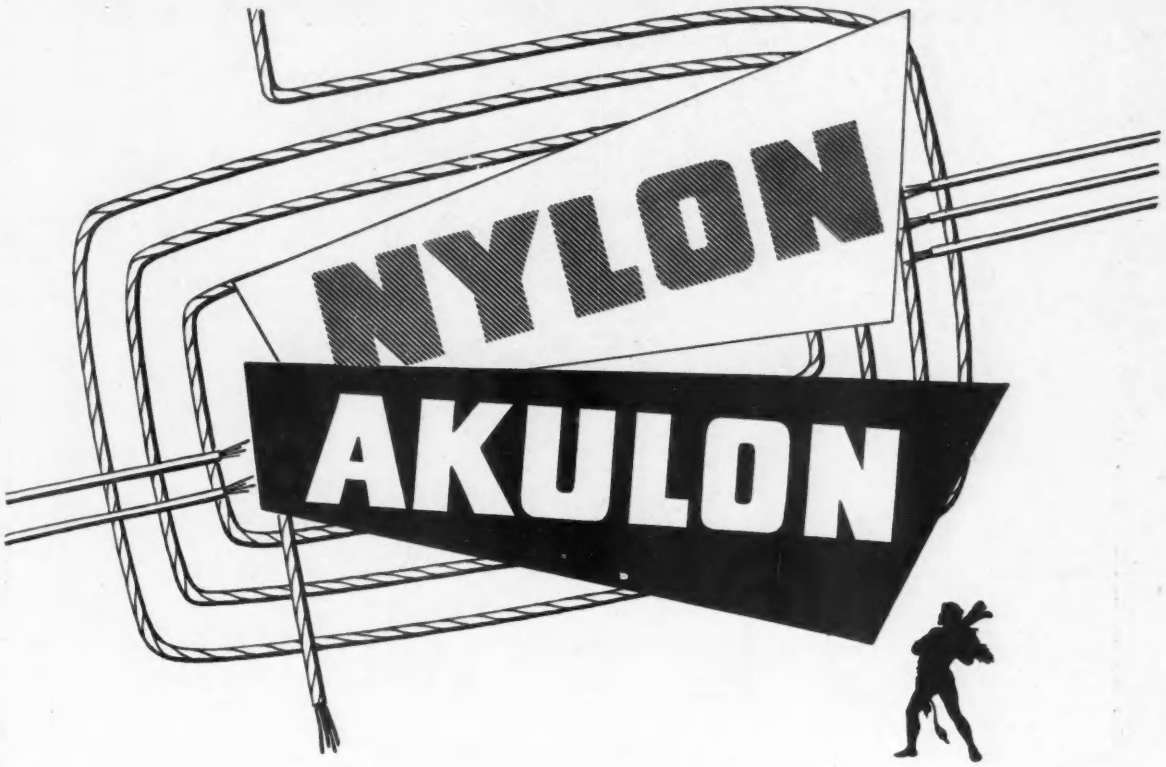




Shown here is part of
a recently completed order for
a 66 panel control board.

**South Wales Switchgear**
LIMITED
BLACKWOOD · MONMOUTHSHIRE

G18




## *For the Electrical Industry*

AKULON has very many outstanding properties that find applications in the Electrical Industry, the major advantages being: Non-inflammability, Heat Resistance and Toughness, to which can be added the economies of the easy production of complex shapes by the Injection and Extrusion Moulding Processes.

AKULON is used in every part of the world as an Extrusion Coating for wires and cables, both as a Primary Insulation and a Protective Sheath. AKULON is used extensively for the latter purpose exposed to every conceivable climatic condition, where it successfully provides resistance to Rough Handling and Abrasion, Petrol and Oil. AKULON contributes the mechanical properties lacking in primary Insulation Coatings.

An example of the use of AKULON in wire covering is for Military Field Wire and Aircraft Cables. Special purpose AKULON grade M2A is used for such wires over an extruded primary insulation of Polythene or Neoprene, meeting current and latest specifications; the AKULON coating being between .003/.007″ thick.

*Manufactured by:*
**ALGEMENE KUNSTZIJDE UNIE N.V.—ARNHEM—HOLLAND**

*Sole Distributors for the United Kingdom:*

**HERCULES POWDER COMPANY, LIMITED**

**140 PARK LANE · LONDON · W · 1**

**TELEPHONE MAYfair 8711**

'CASTLE' LEATHEROID—A PRODUCT OF BRITISH ENTERPRISE AND SKILL. IT IS ENTIRELY OF BRITISH ORIGIN AND IS OFFERED WITH PROMPT DELIVERY AT COMPETITIVE PRICES

'CASTLE' LEATHEROID SUPPLIED IN ROLLS UP TO 48" WIDE, POSSESSES HIGH ELECTRICAL AND MECHANICAL STRENGTH AND HAS BEEN PRODUCED TO MEET THE TECHNICAL REQUIREMENTS OF AN EXACTING SPECIFICATION

★

**'CASTLE' LEATHEROID**

**MANUFACTURED & SUPPLIED EXCLUSIVELY BY**

Vulcanised Fibre Ltd

**GUILDFORD AND EYNSFORD**

**LONDON OFFICE: 8, KING WILLIAM STREET, LONDON, E.C.4 (Tel. MAN 0452)**

**MAKERS OF 'CASTLE' VULCANISED FIBRE SHEETS, RODS, TUBES, MACHINED PARTS & LEATHEROID**

# Quicker HEATING...

# Quicker SELLING

## THE NEW B·N·E C.90 ELECTRIC COOKER

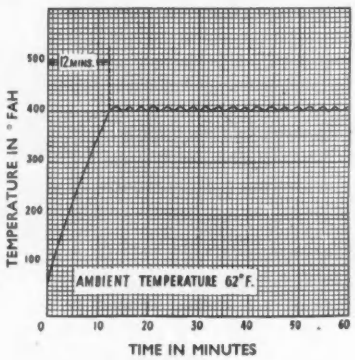
## WITH THE AMAZING SPEEDHEAT OVEN!

The outstanding performance of the "Speedheat" Oven in the B.N.E. C.90 Electric Cooker—the newcomer to the B.N.E. range—will make an instant appeal to the discerning housewife.

Here is a big "easy-to-clean" oven with a new element design which, when coupled with the highly reflective pearl grey vitreous enamel and scientifically controlled air circulation, provides remarkably quick heating with superb cooking qualities.

The pre-heating time is only half that of many standard cookers. Every housewife will realise that this spells greater convenience and considerable saving of time and current.

The graph alongside shows that a temperature of 400°F is reached from an ambient temperature of 62° in **only 12 minutes.**




**Yes, this new "Luxury" C.90 will be a quick seller—particularly when the purchaser knows that an exclusive Pyrex heat-resisting glass casserole/grill pan, a heated drawer, and an 8" radiant plate with simmer control are all included for the moderate price of £48.**

## BRITISH NATIONAL ELECTRICS LTD.

*The Domestic Appliance Section of* JOHNSON & PHILLIPS LTD.

NEWARTHILL MOTHERWELL SCOTLAND

# PHOSPHOR BRONZE

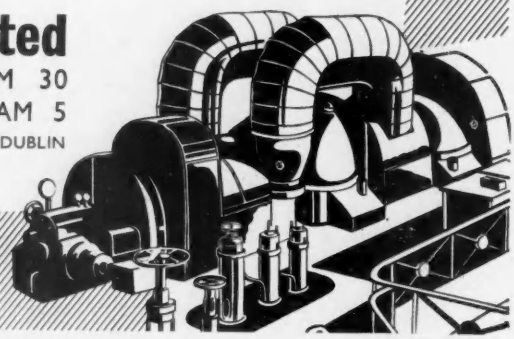
FOR THE ELECTRICAL INDUSTRY

*** SHEET, STRIP, ROD, WIRE, TUBE, CHILL CAST BARS**

*In a range of alloys containing 5% – 12% Tin for specific purposes, to private specifications and to British Standard Specifications.*

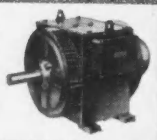
**Charles Clifford Limited**

DOG POOL MILLS, BIRMINGHAM 30
and FAZELEY ST. MILLS, BIRMINGHAM 5
OFFICES: LONDON, GLASGOW, MANCHESTER AND DUBLIN



M-W.106

*Compared with the orthodox alternator with overhung exciter*

| | | | | |
|---|---|---|---|---|
| In | price | weight | volume | c.i.f.charges |
| the | BRUSH |  | Square | Path |
| Alternator | saves | you | about | 20% |

Highly efficient, easily maintained, in an output range from 1½ to 35 kVA, Brush Square Path Alternators are fully described in Publication No. 21043/B40. Send for your copy now!

*SQUARE PATH alternators by* BRUSH

**BRUSH ELECTRICAL ENGINEERING COMPANY LIMITED, HOPKINSON WORKS, CARDIFF, GT. BRITAIN**

Advisory Engineers are available at our Sales Offices :

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Superior Industrial Lighting Fittings — for quick and easy fitting, efficiency and durability. Attractive dove grey finish, or galvanised for exterior work.

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INDUSTRIAL LIGHTING FITTINGS

Walsall

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EXCELSIOR WORKS
WEST BROMWICH · STAFFS

VERSCO

wash boilers
new editions of
a famous range

VERSCO SQUARE BOILER

VERSCO ROUND BOILER

VERSCO SQUARE DE LUXE BOILER. This smart and compact boiler is fitted with castors for easy movement and is finished in cream stove enamel. The table-top in cream vitreous is an attractive feature.

VERSCO ROUND BOILER. Obtainable in Galvanised finish as shown (a most durable finish of special appeal for Corporation and other housing schemes) or in cream stove enamel.

THESE FEATURES ARE COMMON TO ALL VERSCO MODELS: Heavily tinned 10 GALLON copper container—Double pole 3 heat rotary switches A.C. or D.C. (safety cut-out available if required)—Chromium plated taps with heat-resisting handles—Six 500 W clamp-on elements give maximum loading of 3 Kw.—Top surrounds in die-cast aluminium and pressed aluminium loose lids for easy access.

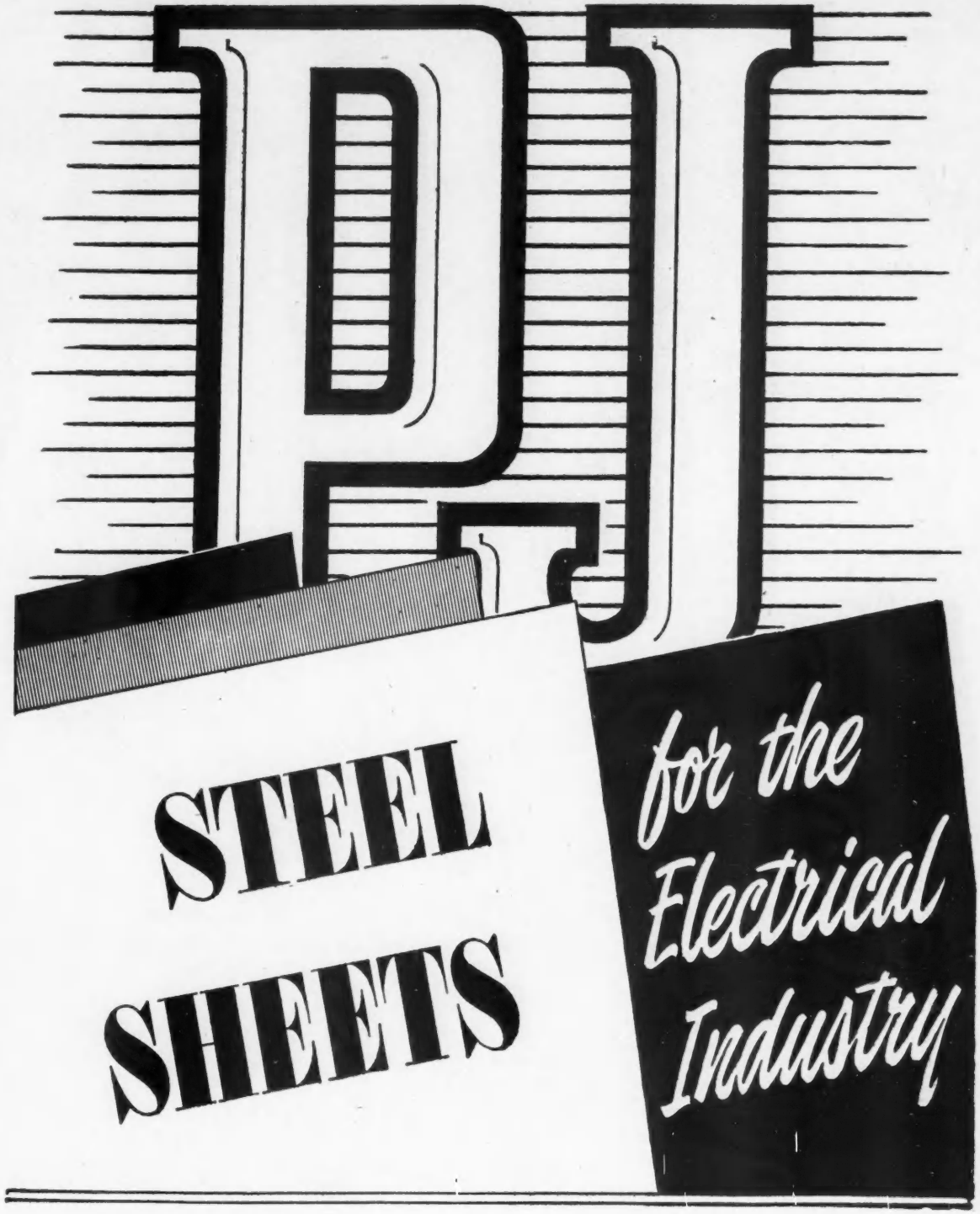
Send for new leaflet giving full specifications and prices.

SWIRLUX

WASHING MACHINES

500H MODEL heats the water, 6 lb. dry weight capacity, 12" wringer which folds down when not in use. Exclusive Swirlux agitator. (Unheated version 500 MODEL also available.) 503 MODEL—10/11 lb. dry weight capacity, full size power wringer with five working positions. Exclusive Swirlux agitator. Power pump and hose for quick emptying. For full details send for Swirlux Leaflets.

**Universal Boilers & Engineering Co. Ltd.,** Fulledge Works, Burnley, Lancs.
TELEPHONE: 3121 and 3203




**PARTRIDGE JONES & JOHN PATON LTD**

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*Telephone:* Pontypool 131/2

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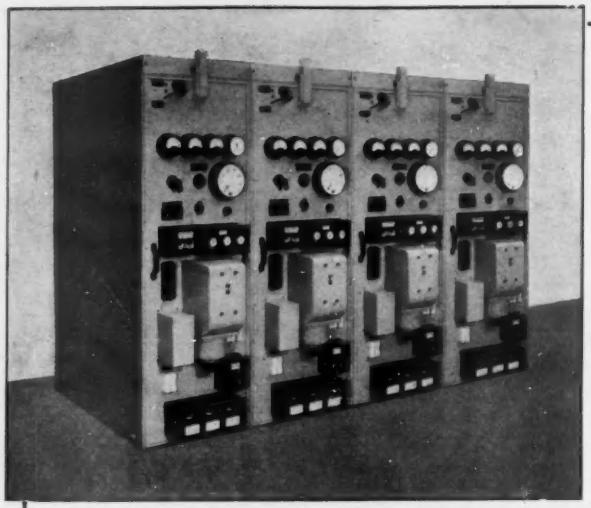
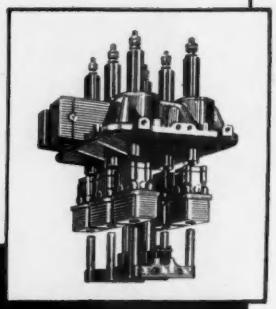


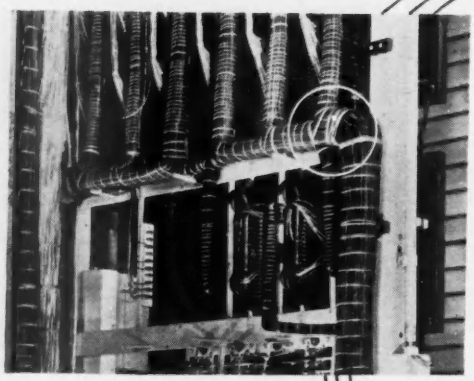
250 MVA
**Switchgear**
with
TYPE H. 25
**oil circuit breakers**
6·6 & 11kV.

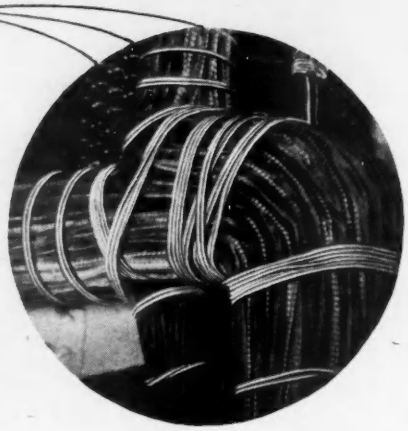


The switchgear is of the air insulated truck or fixed cubicle pattern. The oil circuit-breakers are A.S.T.A. certified and may be arranged for hand, spring or solenoid operation. They can be supplied as loose units for the replacement of obsolete breakers.

**THE NEW SWITCHGEAR CONSTRUCTION CO. LTD.**
WELLESLEY ROAD · SUTTON · SURREY · TELEPHONE: VIGILANT 8234

A2 *Associated with Hackbridge & Hewittic Electric Co., Limited.*





Lacing Threads have to last for more than 20 years under all kinds of climatic conditions—(including great fluctuation in humidity).

**FINLAYSON'S THREAD.**
has more than proved equal to the job.

**FINLAYSON'S**

**"LANCEFIELD" FLAX LACING THREAD**

**FINLAYSON, BOUSFIELD & CO., LTD., JOHNSTONE, SCOTLAND**

# A united family!

But they don't have to be together. Put the motor where it can best do its job, tuck the controller away out of sight, and have those alert, instantaneous acting buttons and sensitive speed controls right where you want them — under your fingertips.

The ½ h.p. 'ENGLISH ELECTRIC' Magamp will give you push-button control in forward or reverse and flexible speed variation over an 8 : 1 speed range for a thousand and one tasks.

Except for the forward and reverse relays, there are no moving parts and no valves, consequently maintenance is practically unnecessary.

Typical applications for 'Magamp' motor control drives are:— power sewing machines, bobbin winders, work handling jigs, small lathes and potters' wheels.

# 'ENGLISH ELECTRIC'

## 'magamp' motor control

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

*Industrial Electronics Division "E", Stafford*

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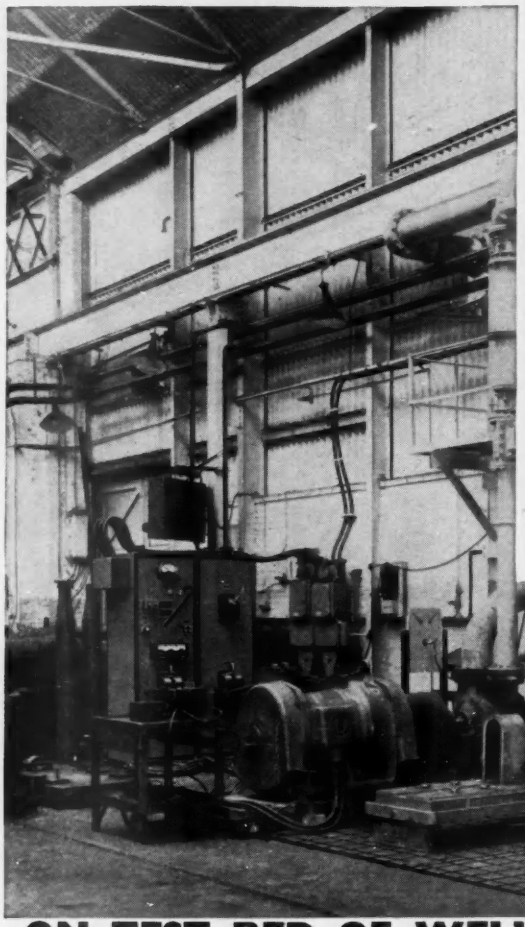
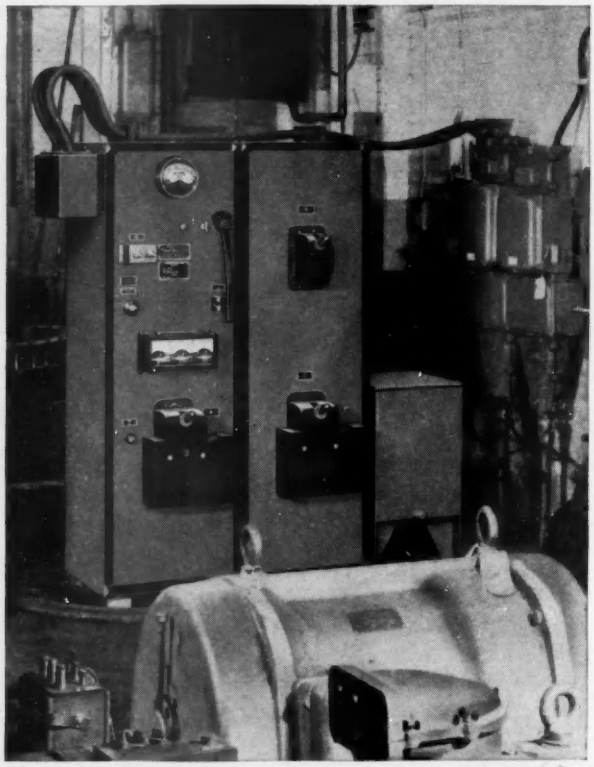
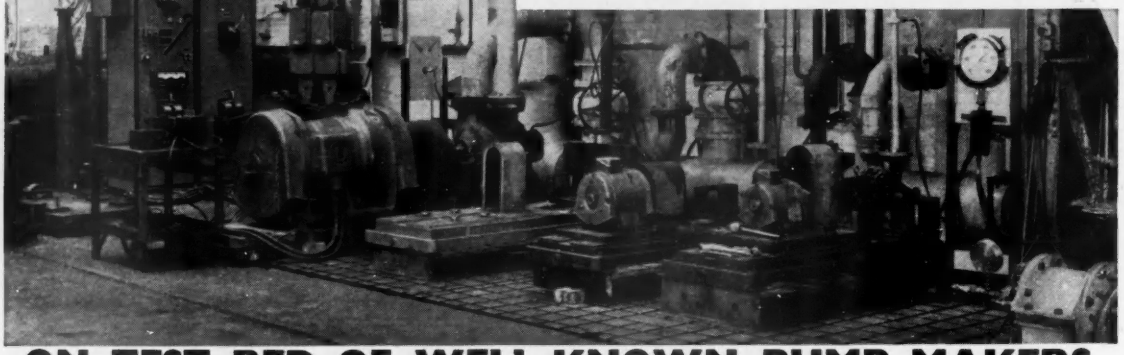
# "Erskine Heap" SWITCHGEAR







## ON TEST BED OF WELL-KNOWN PUMP MAKERS

This three oil switch type of Auto Transformer Starter with Korndorffer connections for testing the electrical side of their pumping plants, was recently manufactured for, and installed on the test bed of the well-known Pump Makers, Messrs. Hayward-Tyler & Co. Ltd., of Luton, Bedfordshire.

*We manufacture:*

**L.T. SWITCHGEAR** *50/5,000 Amperes* **E.H.T. SWITCHGEAR**
*up to 11kv 250 MVA rupturing capacity* **MOTOR CONTROL GEAR** *¼/5,000 H.P.*

*May we have your enquiries?*

**ERSKINE, HEAP & Co LTD**

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IN ALL PARTS OF THE WORLD

656

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## Top Efficiency
## Sodium Lamps
## are helping to make British roads safer after dark

RIGHT from the start in 1932 Philips have pioneered Sodium Lamps—now used so extensively for public lighting, floodlighting and some types of industrial lighting. Over the years Philips Sodium Lamps have been consistently and continually improved in quality, light output and life, and the great majority of Sodium Lamps used on the roads of Great Britain are made by Philips.

PHILIPS

**PHILIPS ELECTRICAL LTD.**

LIGHTING DIVISION, CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON, W.C.2.

LAMPS · LIGHTING · RADIO · TELEVISION · 'PHILISHAVE' DRY SHAVERS
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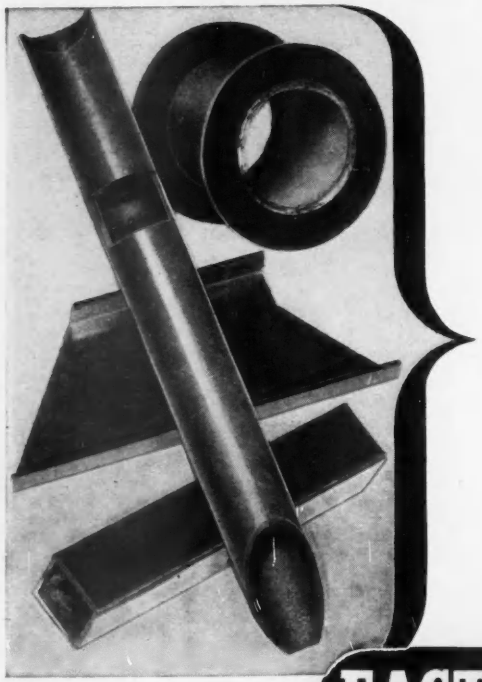
In Association with BRYCE ELECTRIC CONSTRUCTION Co. Ltd.
Branches at BIRMINGHAM, BRISTOL, CARDIFF, MANCHESTER, NEWCASTLE, SHEFFIELD



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Electrical Insulation
We manufacture and fabricate all types of Laminated Bakelite Insulations.
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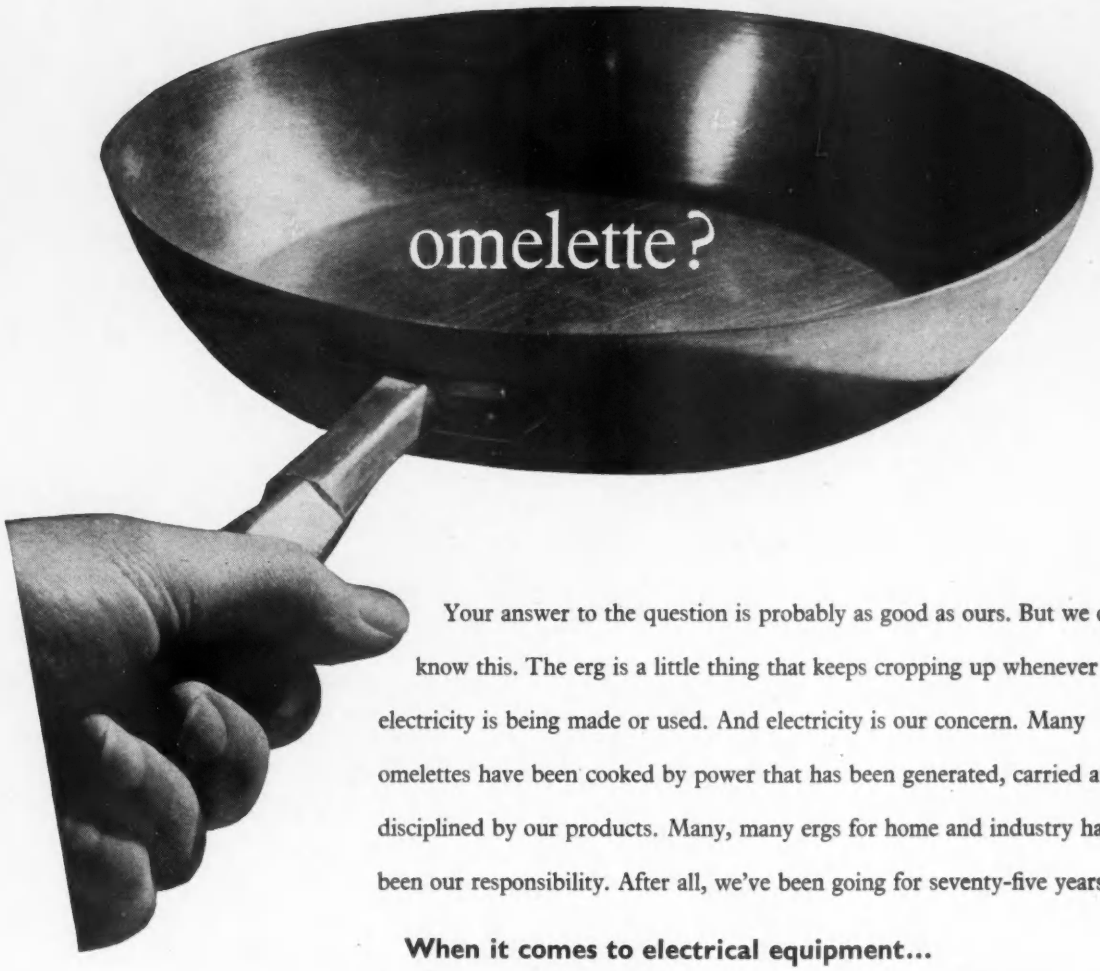
# How many **ergs*** go to make an omelette?



Your answer to the question is probably as good as ours. But we do know this. The erg is a little thing that keeps cropping up whenever electricity is being made or used. And electricity is our concern. Many omelettes have been cooked by power that has been generated, carried and disciplined by our products. Many, many ergs for home and industry have been our responsibility. After all, we've been going for seventy-five years.

**When it comes to electrical equipment...**
**You've got to hand it to**

**Crompton Parkinson** LIMITED

ELECTRICAL EQUIPMENT

MAKERS OF ELECTRIC MOTORS OF ALL KINDS · ALTERNATORS · GENERATORS SWITCHGEAR · B.E.T. TRANSFORMERS · CABLES · INSTRUMENTS · LAMPS · LIGHTING EQUIPMENT · BATTERIES · STUD WELDING EQUIPMENT · TRACTION EQUIPMENT

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*A footnote to remind you that the erg is the measurement of work done by the force of one dyne acting on a body through a distance of one centimetre. Take an erg to the seventh power of ten and you've got a joule, which is the work expended in a second by a current of one ampere flowing through one ohm . . . but why should we let that bother you?

# Power Factor Correction Capacitors

The installation of Dubilier Capacitors for power factor correction, effects such substantial saving in cost of power that the capital outlay is recovered in a short period of time. Occupying minimum floor space and requiring no maintenance, Dubilier Power Factor Correction Capacitors are absolutely reliable. Is there room for such improvement in *your* factory? Our engineers will carry out a full investigation of your present power factor and advise you without cost or obligation.

A small factory installed a Dubilier Capacitor to correct their power factor from 0.68 to 0.95, thus reducing their maximum demand from28kVA to 20kVA.

**Cost of Power**

| | £ s. d. |
|---|---|
| Before installing Capacitor | 276 12 0 |
| After installing Capacitor | 228 12 0 |
| **Saving per annum . . . . .** | **48 0 0** |

*Approximate cost of Capacitor equipment £65.0.0 thus paying for itself in little over a year.*

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CONDENSER CO. (1925) LTD

DUCON WORKS, VICTORIA ROAD, NORTH ACTON, LONDON, W.3.
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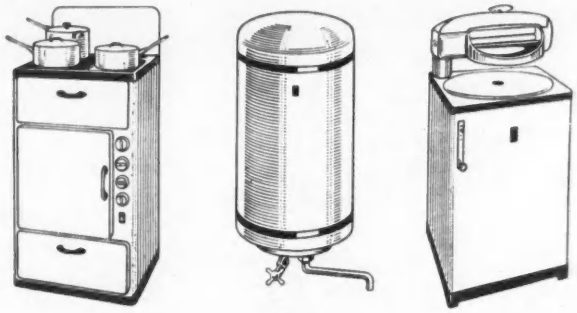
D98B

Backer

# TUBULAR SHEATHED HEATING ELEMENTS

provide

## A "RADIANT" SUCCESS



in

## THE FOUNDATIONS OF MODERN LIVING

**BACKER'S CONTRIBUTION INCLUDES**

All types of Radiant Hotplates — Oven Elements and Warmer Drawer Elements for Electric Cookers — Washing Machine Element Units—Immersion Elements—Electric Kettle Elements Iron Soleplate Elements — Storage Water Heating Units and Percolator Elements.

● **We also design special Elements for Industrial uses**

**BACKER THE PIONEER OF TUBULAR SHEATHED HEATING ELEMENTS**

**BACKER ELECTRIC COMPANY LIMITED**
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The wide range of EKCO quality lighting equipment includes tungsten lamps for all purposes and Ekco double-life fluorescent lamps of all colours and sizes—of which the high efficiency *Ekco White* is an outstanding example.

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EL 7

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*The main erection bay with special impulse testing station in foreground.*

The modern Ferranti transformer factory at Hollinwood has a manufacturing capacity per annum of over 5,000,000 kVA of Large Power Transformers, Distribution Transformers, Voltage Regulators, A.C. and D.C. High Voltage Testing Equipment and Specialised Equipment and covers an area of approximately 186,000 square feet.

*A view of the Ferranti Transformer Factory at Hollinwood.*

**FERRANTI LTD.** Head Office and Works, **HOLLINWOOD LANCS.**

*London Office:* KERN HOUSE, 36, KINGSWAY, W.C.2.

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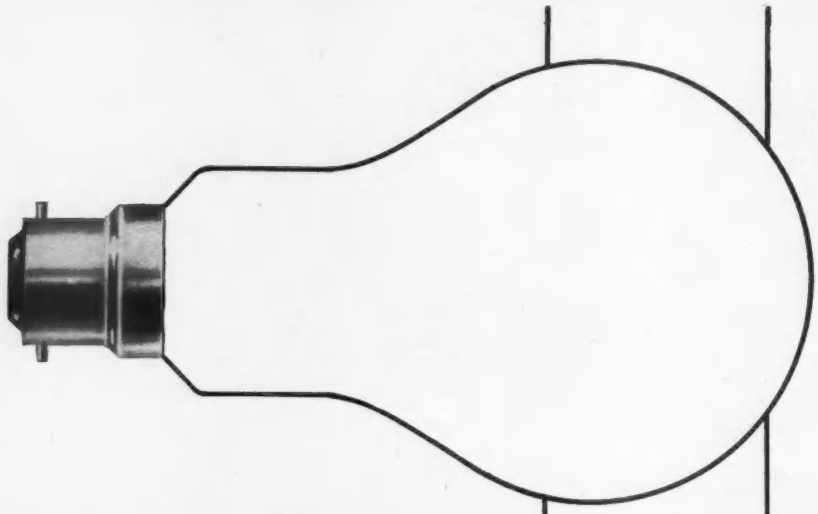

**Shining lights for nearly 50 years!**

*Elasta's quick service and experience have been shining lights in the lamp industry for nearly fifty years. It is therefore wise always to specify Elasta lamps and fluorescent tubes. Made to appropriate British Standards — an E.L.M.A. brand!*

Elasta
LAMPS
AN E.L.M.A. BRAND

**TUNGSTEN FILAMENT AND FLUORESCENT**

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Branches: MANCHESTER LEEDS LEICESTER BIRMINGHAM BRISTOL BELFAST (NORTHERN IRELAND)

# IF your EQUIPMENT, PLANT or PROCESS demands a STEADY POWER SUPPLY...

you need a FOSTER AUTOMATIC VOLTAGE REGULATOR

Regulators similar to that illustrated above have been supplied to diverse industries in sizes ranging from 10 kVA to 400 kVA. In addition to which, many special types of regulators have been designed for building into customers' own equipment. Our specialist engineers would be glad to discuss your problems and perhaps show you where the efficiency of your plant can be improved by ensuring a "Steady Power Supply".

*It pays to solve Voltage Problems before they happen!*

**FOSTER TRANSFORMERS LTD. SOUTH WIMBLEDON LONDON S.W.19**

A 'LANCASHIRE DYNAMO HOLDINGS' COMPANY

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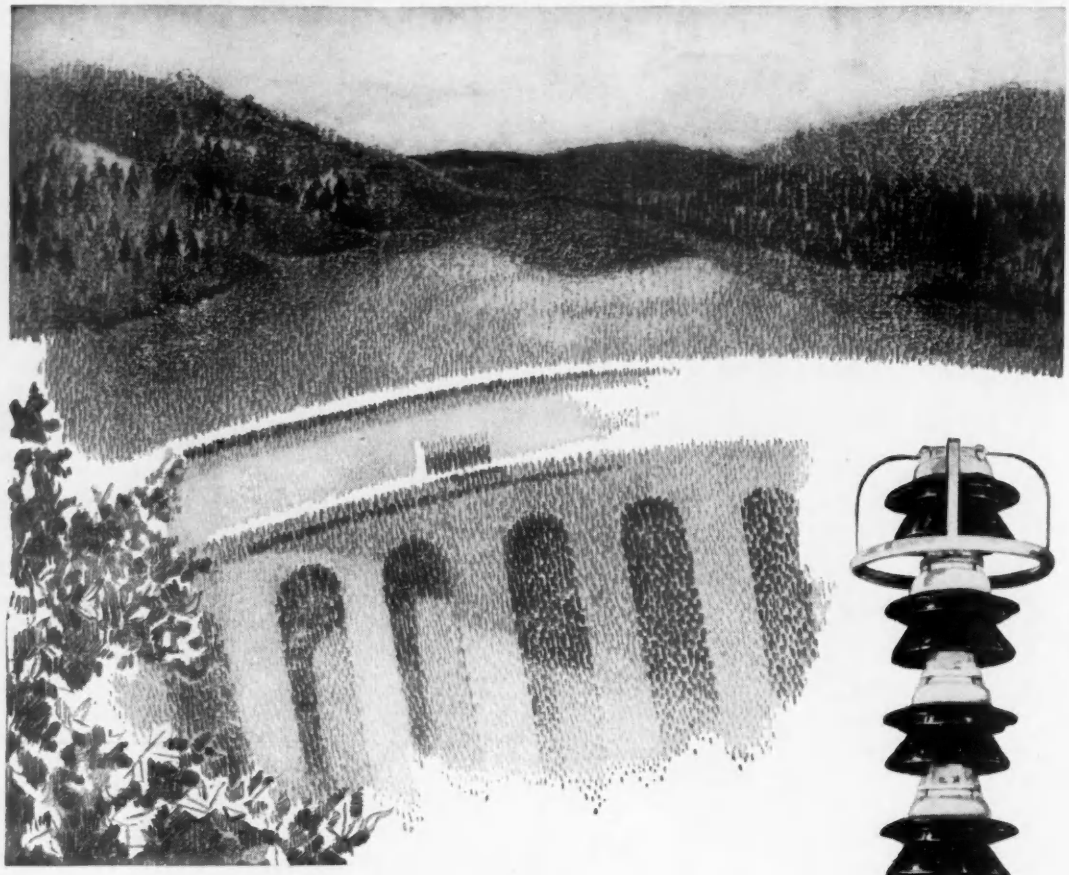

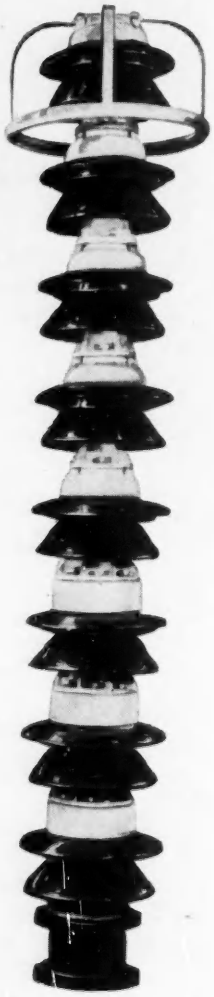

*Taylor Tunnicliff*
*who have a world-wide reputation*
*for the excellence of*
*their* *Post Insulators*
*are now supplying the majority*
*of Post Insulators for the*
*British 275 kV. Super Grid*

***Taylor Tunnicliff first quality porcelains***

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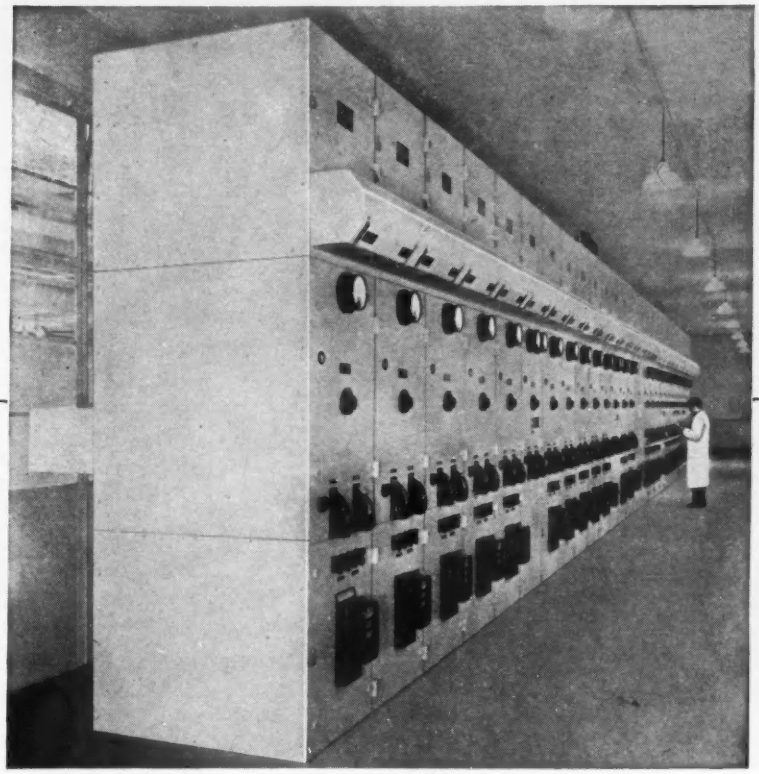
*Telephone :* STOKE ON TRENT 25272
*London Office :* 125 HIGH HOLBORN, W.C.I · TELEPHONE : HOLBORN 1951

# *Air circuit breakers for medium voltage distribution*



The 'ENGLISH ELECTRIC' 415 volt, 25 MVA duplicate busbar switchboard, illustrated, incorporates type OB3 air circuit breakers. This type of circuit breaker has a maximum current rating of 1600 amps and a breaking capacity of 30 MVA.

The photograph of the installation is shown by courtesy of Leyland Motors Limited.

# 'ENGLISH ELECTRIC'

## switchgear

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

*Switchgear Department, Liverpool.*

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

SL.17.D4

## REASONS

**CHLORVAR III** is a varnish which will withstand FIRE RESISTING CHLORINATED COOLING FLUIDS such as are now used in transformers.

**COVAR I** is a varnish which will withstand CUTTING OILS, ESTER-LUBRICATING OILS AND CHEMICAL FUMES. It is a perfect insulator under most stringent conditions.

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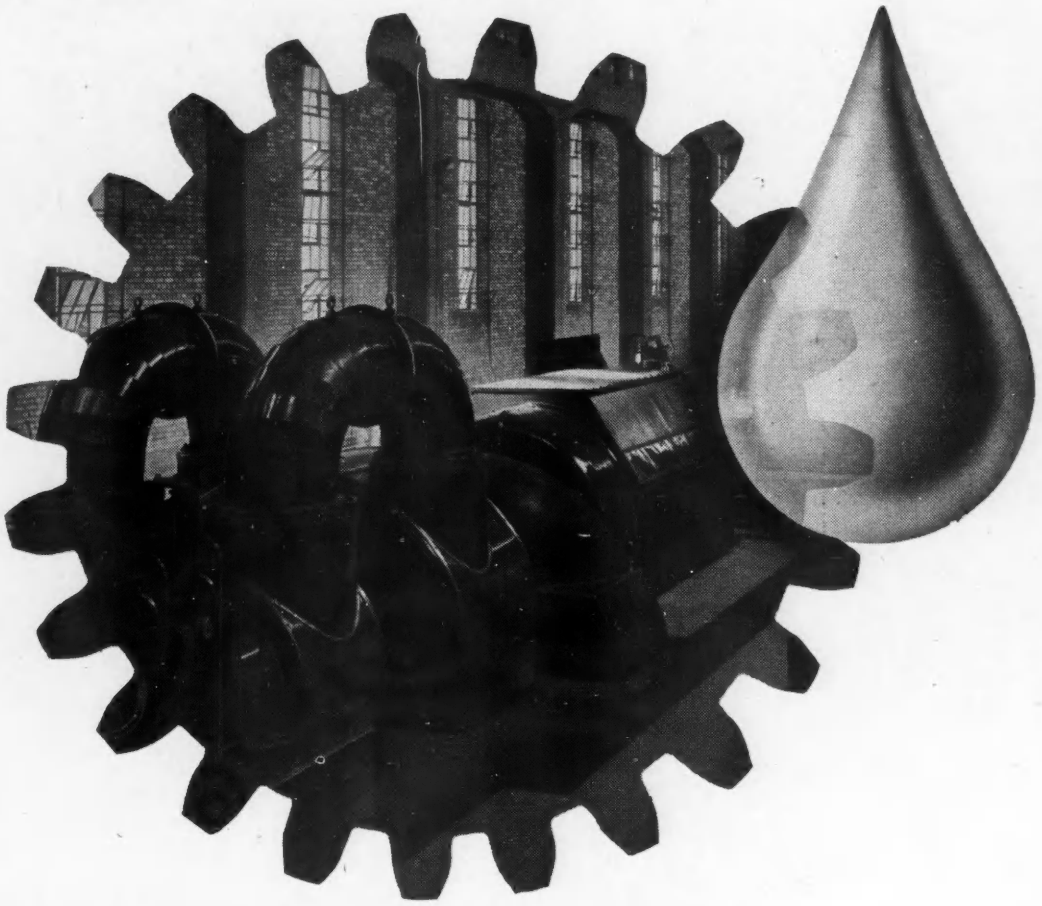
*London Office and Warehouse :* 6 London Road, Brentford, Middlesex. *Telephone :* EALing 9153

A.867



**Machinery runs longer and more smoothly on**

**BP ENERGOL**

**the engineer's oil**

Distributors of BP Energol Lubricants in Great Britain for Industrial and Marine purposes

THE POWER PETROLEUM COMPANY LIMITED

Head Office: 76/86 Strand, London, W.C.2.

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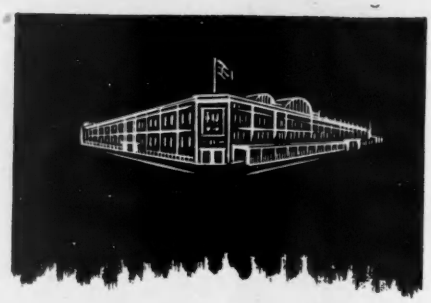

*Change-over*

# SWITCHBOARDS

## OF UNIT CONSTRUCTION

Low tension duplicate Busbar switchboard with 20 outgoing 300 amp change-over switches to select from main or standby supply.

All outgoing circuits fused and arranged for metering.

The equipment shown above was designed and manufactured for

THE

**OLYMPIA**

LONDON

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## ELECTRO-MECHANICAL MANFG. CO. LTD.

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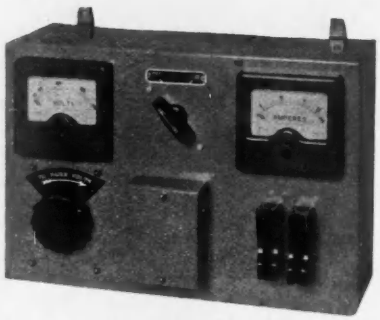

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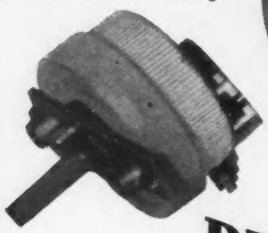

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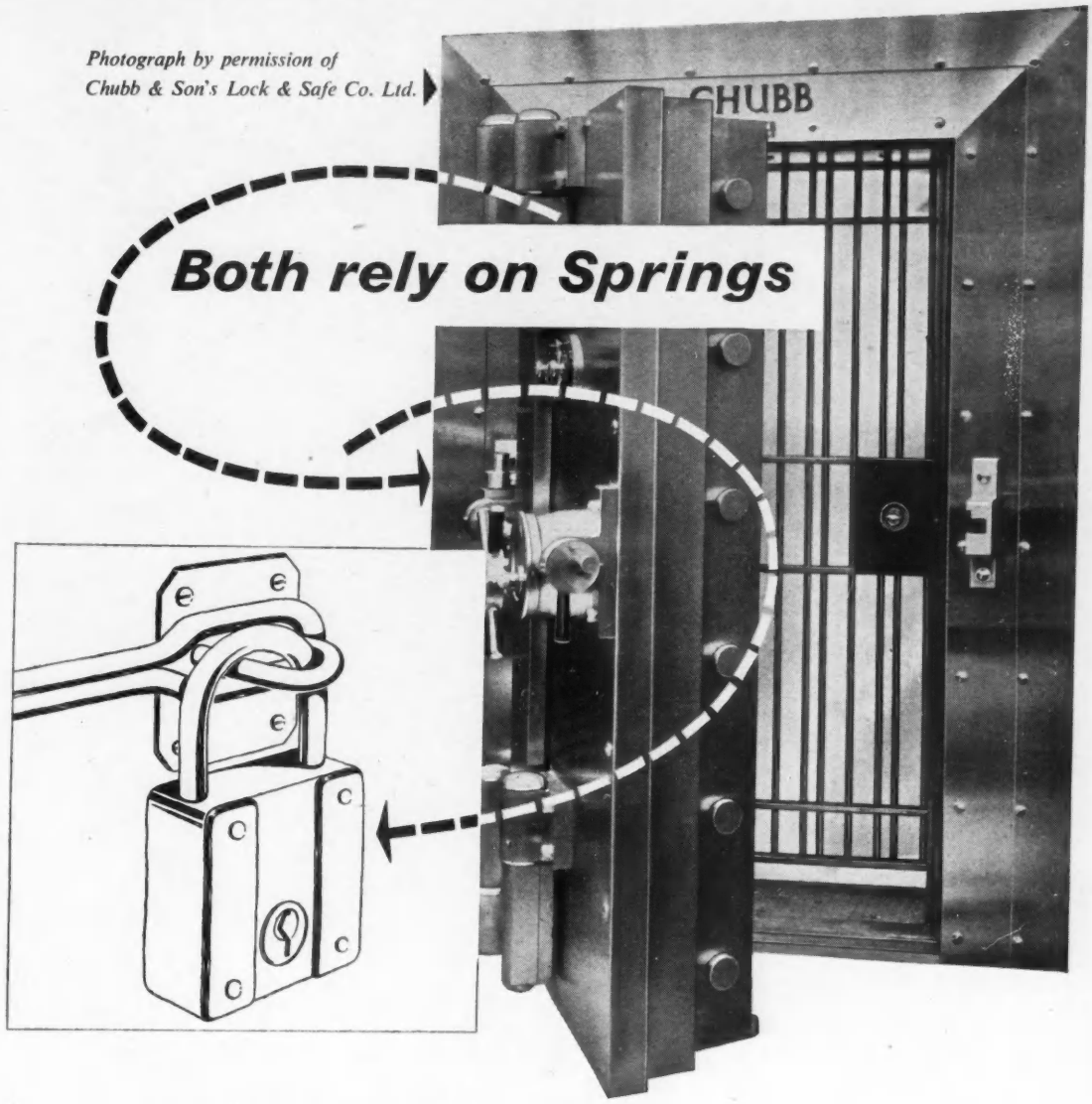


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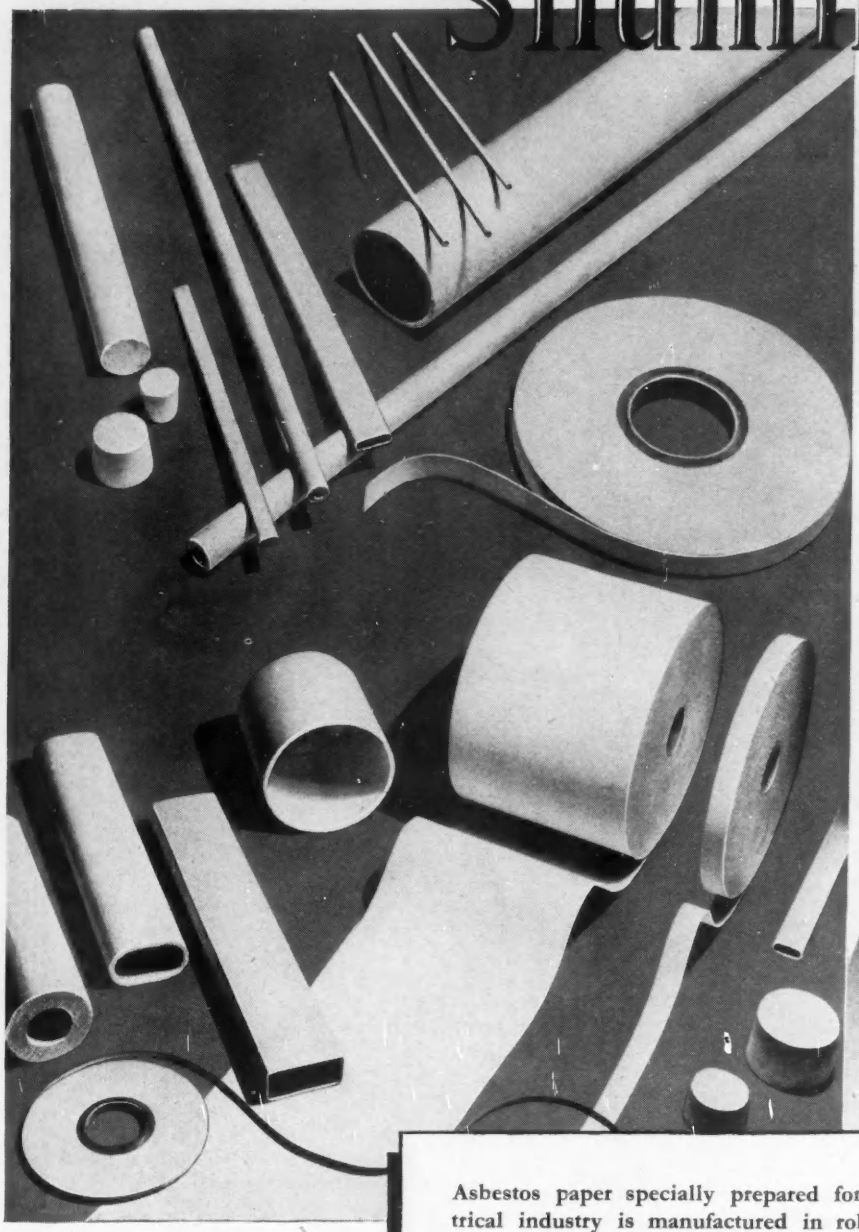

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## HOME PRODUCED SELENIUM?

Selenium is an element well distributed in the earth's crust, yet nowhere so concentrated as to be worth mining on its own account. It became available to industry as a by-product in copper refining; now, because of its proved value, demand is running ahead of the supply, which is necessarily determined by the amount of copper produced. This is the background to a newly-published D.S.I.R. survey of the present shortage of this semi-conductor, whose main use is in the metal rectifier. With world demand for such rectifiers increasing by 25% per annum according to one estimate, the value of any new source of selenium supply is starkly apparent; that the shortage may be vitally serious is illustrated by the experience when the 1952 defence programme was introduced. The percentage of selenium rectifiers going to the Services rose sharply from 9 to 55%. The attack on this problem sketched in the new survey is necessarily two pronged: economy in use of selenium and development of new sources of supply. Early progress may be hoped for in terms of using less selenium per rectifier, but the complications of semi-conduction make development of new techniques or substitute materials largely a matter of empirical experiment rather than confident advance on a basis of well-developed theory. It is the other wing of the advance which offers the earlier chance of a fundamental improvement. It seems that in the new pyrites flash roasting plants coming into operation for the production of sulphuric acid, selenium-bearing dust is concentrated in one part of the plant. Everything depends on the development of a reasonably inexpensive extraction process for the selenium, but if this proves possible, the United Kingdom will have for the first time, home production of selenium, on a scale of a few tons per year: a small but significant improvement on the present reliance on imports of some 80 tons/year.

## LIGHT AND LIVES

It is to be expected of any body concerned with our roads, that it will give serious attention to the accident casualty figures which press so heavily on the social conscience today. At this year's Conference of the Association of Public Lighting Engineers, the presidential address and two supporting papers tackled the problem, with a close analysis of the relevant statistics that brings more conviction than the generalities sometimes voiced on the topic. That better road lighting can reduce the accident rate is, of course, disputed by no one. The question is one of cost and effectiveness compared with other possible improvements fighting for selection in the present

restricted economy; and here the figures presented are most persuasive. Will they succeed in persuading those who matter, however? It has been emphasised that it is not enough to light well the principal traffic routes of a district: less important alternative roads must also be attended to if a disastrous increase of traffic on the improved route, attracted by its easier conditions, is not to offset the safety advantages better lighting offers. The suggestion for one town to be lit to the highest standards, as a large scale experiment to demonstrate to doubters just how much first-rate lighting could limit the casualty list, was made without much hope at the Conference. Yet it is a bold scheme of this type which might by its results convince the administrators who control the purse strings, of the worth of improved street lighting. Might not a strong co-operative effort by the interested parties in the electricity industry make such a project realisable after all?

## AWAY WITH GAS!

Gas lighting for our roads is dying: there can be no doubt of that basic fact; but it still has a kick left to delay its final departure. This was again apparent at Eastbourne, when there was an ingenious appeal to extend the life of existing gas side-street lighting by modernising reflectors and other lantern details, rather than go to a complete replacement by electrical equipment. An insidious appeal this, based exclusively on capital cost considerations, with a promise of eventual change to electricity when times become easier. It had its answer at Eastbourne, as it should have done: lower running and maintenance costs soon offset the necessary capital expenditure involved in a full change-over to electric lighting, and with this in mind, why should the public in any locality be denied for longer than necessary the many advantages and the higher standard of illumination that electric lighting can offer? As Mr W. J. Jones told the B.E.P.C. a few months ago, it would be folly to embark on a gas modernisation scheme at this stage of development in street lighting.

## STANDARDS STAY PRACTICABLE

Publication after a full Annual Report on the work of the British Standards Institution for the first time since the war gives a conspectus of the activities of that organisation which cannot fail to impress. Some 14,000 senior representatives of industry, the professions and Government are involved in its work, which now extends so far beyond the narrow frontiers of dimensional standardisation. There has always been pride that voluntary agreement is the basis of standardisation in Great Britain; the quantity and quality of the unpaid work that backs up standardisation is an eloquent tribute to the importance everywhere attached to this. These twin features come together in the emphasis the report gives to the Institution's considered policy on research that it is better to rely on industrial resources where new work is required in connection with standardisation, rather than set up some central laboratory for this purpose. If necessary investigations are carried out, not by some hypothetical professional standardisers, but rather by those who will have eventually to live with the rules formulated on the basis of the results obtained, it is likely that possible difficulties will be the more diligently sought and accurately reported. Practicability goes hand in hand with acceptance as a reward of continued close adherence to the voluntary principle in standardisation.

## DECADE OF ATOMIC ADVANCE

Three authoritative forecasts given last week on the speed of advance in nuclear power generation brought the most definite short-term estimate yet: Mr L. Rotherham of the Atomic Research Authority suggested one million tons of coal equivalent output in ten years' time. This will be only marginal in effect, for Great Britain's public electricity supply must be expected to be using 60 to 70m. tons of coal a year by then, unless the change to oil firing is on a far greater scale than present plans suggest. Admittedly, after the next decade, rapid progress in nuclear generation is promised, but the above figures throw into relief the urgency of the task facing the Atomic Energy Authority. Moreover, it cannot consider coal economy alone: supplies of uranium may not in the early stages be over-large for the job in hand, and this factor as well as cost considerations necessitates a lengthy process of experimentally determining the most efficient form of reactor before large scale expansion gets under way. At present, although the Authority is collaborating closely with British industrial firms, it is directly responsible for owning and operating reactors. In this respect, it is relevant to note that American companies, under the law recently passed, may lease fissionable fuel from the Government and themselves operate nuclear reactors for development and production purposes. Whether a similar arrangement would appreciably speed development here is doubtful, but its effectiveness in the U.S.A. will be watched with critical interest.

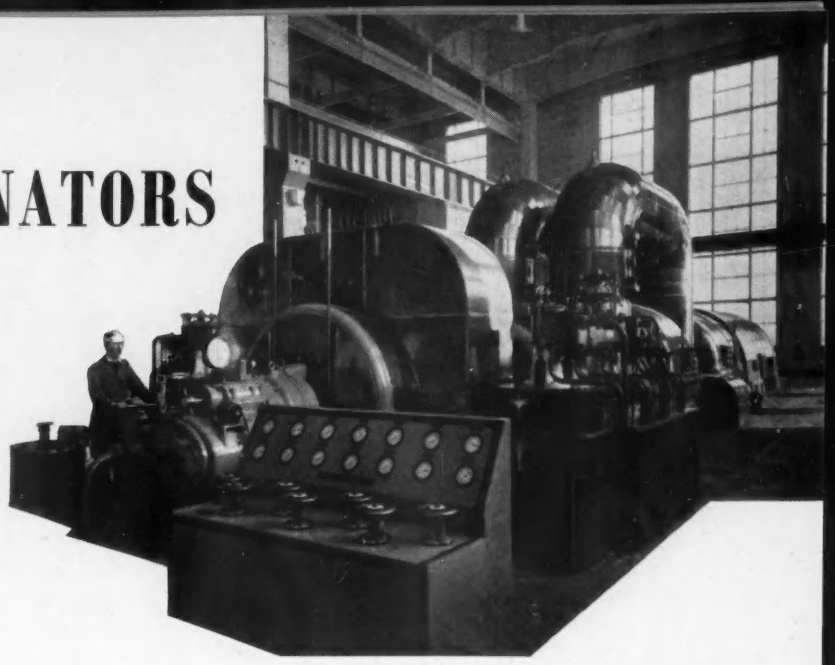
## SAG IN POWER PLANT

O.E.E.C.'s annual Survey of Heavy Equipment for Power Plant has become established as a valuable source of Europe-wide statistics. In its newly published seventh volume it takes on a new interest: for the first time since the war, the order books for most types of plant are less full. Except for large transformers and alternators for hydro-stations, demand is down on the level a year ago, an unusual situation for anything connected with the persistently expansionist business of electricity supply. The authors of the Survey are confident that this sag in plant demand is only temporary and, indeed, some reasons for it are not hard to find. The task of replanting war-scarred stations is nearing its end, and further, manufacturers are feeling the effects of their own re-equipment. As a result, delivery periods are almost everywhere down, in some cases sharply, particularly with respect to steam turbo-alternators. Thus orders that must have been recorded a few years ago, were they to be satisfied in time, are not yet placed. On the whole, then, this fall in orders may be taken as a healthy sign, significant of a better balance between production and demand in a vital branch of Western European economy.

Meteor

Electrical Times, 23 September, 1954

# TURBO-ALTERNATORS



*Starting up a large turbo-alternator in a modern power station*

## Problems of starting large machines

By J. S. Hall, B.Sc.(Tech.) A.M.I.E.E.*

IN considering the problem associated with the starting and stopping of steam turbines, it is desirable in the first place to refer in some detail to some of the structural features more particularly involved. Fig. 1 shows a three-cylinder 60 MW turbine complete. This is the kind of machine that has been installed extensively in power stations during the post-war period. Although newer designs employ two cylinders, a large number of machines are of this type and have long periods of service in front of them. However, most of the following applies to steam turbines generally and tends to focus on the high temperature end which remains generally similar in either two or three cylinder designs.

### *Structural Turbine Features*

Fig. 2 shows, in simplified diagrammatic form, those elements that are particularly interesting from the starting point of view. The turbine consists essentially of a bladed rotor carried in bearings in such a way that it rotates inside a casing carrying fixed blades. Where the rotor passes through the steam casing at each end, there is a labyrinth type of gland to reduce steam leakage to the minimum. The rotor is located axially by means of a thrust bearing. The rotor may be connected to the driven machine, or to other steam rotors in a compound arrangement, by means of rigid, semi-rigid, or flexible couplings.

A steam turbine is a heat engine using steam at high pressure and temperature, and it must be designed structurally, as well as thermodynamically, accordingly. The casing is essentially a cylinder with ends, split horizontally to permit assembly. The thickness of the cylinder is determined, for a given thermodynamic design, by the properties of the materials available. Where the steam conditions are high, thick cylinders are unavoidable.

Bolts are the usual means of holding the two halves together. The bearings carrying the rotor are with only few exceptions, of the type that is flushed with oil. It is the usual practice, based on accumulated experience, to allow a clearance between journal and bearing of about 0·0015 in. per in. of diameter, so that a journal of 8 in. diameter will have a diametral clearance of about 0·012 in. The glands are of the non-contact type, relying for their sealing effect on a large number of successive fine clearances with baffles between. The clearance cannot practically be finer than the bearing clearance, but even with this allowance glands are designed so that slight rubs should cause no serious permanent damage. The fixed parts of the glands are carried in the hot cylinder. The rotor is carried in the cool bearing pedestals. The connections between pedestals and cylinder are designed to maintain concentricity between rotor and glands at the same time permitting relative thermal expansion.

Couplings may be of the rigid or flexible type, and the former may be increasingly used in the future. However, various forms of flexible couplings, using gear teeth, claws, or springs are at present in general use. In larger sizes of machine these present quite a formidable problem in accuracy of manufacture and lubrication. The rotor itself may be substantially a single steel forging, or it may be built up, with sleeves, and possibly with some discs, shrunk on to a shaft. It will be at a high temperature, approaching the steam temperature. It may weigh several tons, and probably runs at 3,000 r.p.m.

At numerous points the axial clearances of blade shrouding are of the order of 0·050 in. to 0·100 in., and those of the gland baffles from 0·100 in. at the end nearest the thrust to, say, 0·25 in. at the end remote from the thrust.

This then is the piece of mechanism that has to be started up from a stationary condition, brought up to speed, and loaded.

### *Heating and Starting Up*

The turbine has been primarily designed to develop its load at its rated speed under the pressure and temperature conditions specified. It must be assumed that when stable conditions have been established, it will do this smoothly and reliably. Experience shows this assumption to be generally well founded. Stable conditions include the

*Assistant Chief Engineer, Steam Turbine Department, Metropolitan-Vickers Electrical Co., Ltd. This article is based on a lecture given to the E.P.E.A. by the author and Mr G. Howarth.

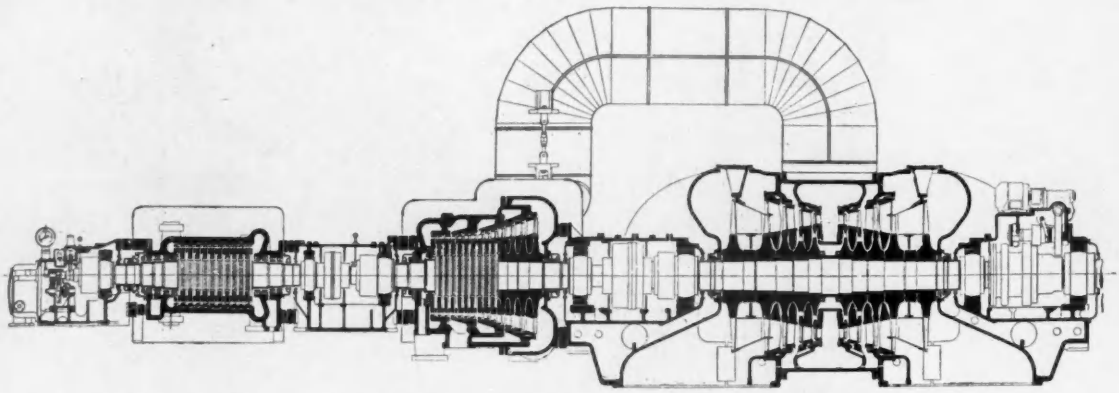


*Fig. 1. Section through three-cylinder 50 MW steam turbine designed for steam conditions of 900 lb/sq in., 900° F, 3,000 r.p.m.*

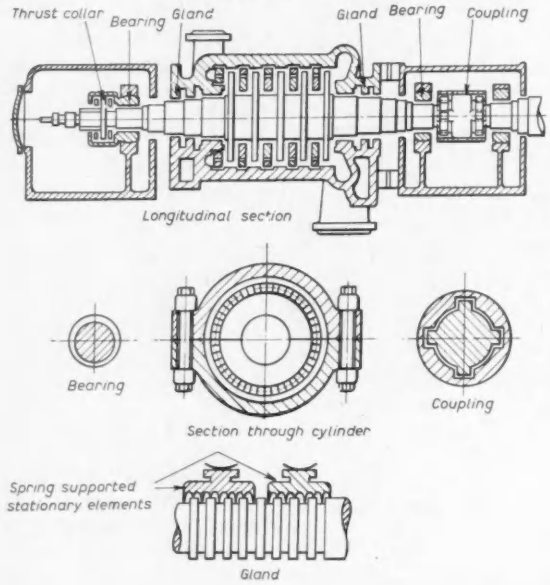
nomal thermal gradients from inlet to outlet, etc., all thermal expansions fully and free developed, and alignment within tolerable limits. If the turbine could suddenly be put into this condition, the start could be very rapid. It is proposed to examine the difficulties which lie in the way of this ideal.

The process of starting a turbine then, is largely the process of heating it up to its working temperature. It is important to realise that the medium by which this heating is achieved is the steam which also drives the turbine.

## *The Casing*

Let us first consider the casing. What limits the rate at which this can be heated? Heat is transferred from the steam to the inside surface, and this, therefore, tends to expand before the remainder of the metal. If it is desired to limit the relative expansion between inner and outer surfaces to a strain which is well within the elastic limit of the material, then the temperature difference between outside and inside should not exceed say 100° F. The ends, in particular, present a rather special problem, involving relatively complex shapes, but the general basis is usually a cone which tends to be self-compensating for temperature gradient. It is probable, nevertheless, that for similar temperature gradients the ends will have local stresses higher than in the cylindrical part. Unfortunately, the inlet end is the part that is called upon to suffer the greatest temperature gradients.

*Fig. 2. Elements of turbine mainly affecting starting technique are shown below in diagrammatic form*

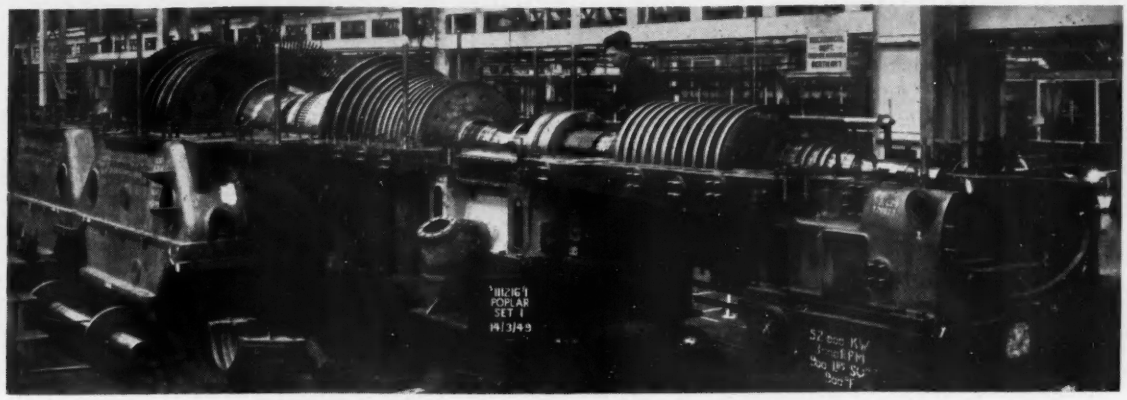



Experienced design, as simple as possible, and sound materials are the means of ensuring ends that will stand up to temperature gradients. It is very difficult to obtain precise information on the stresses in an existing end, and equally difficult to predict them on the drawing board.

Looking for a moment, for example, at the horizontal joint bolts, these are strained in the process of tightening, and, unless special heating arrangements are provided, they may be further strained due to the prior heating of the flange around them during starting. If this straining is excessive, leakage will result. Bolts must, therefore, have sufficient margin of elasticity to avoid overstrain at the rate of running up, i.e. heating, it is desired to achieve. Some idea of the importance of the foregoing cylinder considerations may be obtained from the temperature measurements shown in Fig. 3. These were taken on the h.p. cylinder of a machine similar to the one shown in Fig. 1. The occasion was a start after a 6-hour shut-down. It was a fairly rapid start, the turbine being on speed 30 minutes after the start of rolling, with load applied thereafter at nearly 4 MW per minute. Steam was taken from a range at a constant temperature of 925° F.

The thickness of metal in the cylindrical part of the casing was about 3¼ in., and the horizontal joint bolts were 4 in. diameter. This machine had arrangements for flange heating, with circulation round the bolt shanks, but since this was a normal design feature, no unusual advantage was conferred thereby. Referring to Fig. 3, it will be seen that at one period the metal temperature in the cylindrical part "L" was rising at the rate of 400° F. per hour. The inside of the horizontal flange "H" lagged behind "L" by about 100° F, whilst the outside of the flange "J" was a further 60° F behind. The bolts "V" and "R" were at approximately the mean flange temperature throughout the start.

The conclusion to be drawn from these temperature measurements was that during this start the temperature levels and rate of heating were well within permissible limits. There was, in fact, a substantial margin to allow for possible higher gradients in difficult places not covered by the observations. It is now about two years since the observations were made. The machine was at that time and has since been subjected to a number of rapid starts. Recently it was opened up for examination, and



*The turbine of a 52 MW set for Brunswick Wharf seen here with casing removed affords an interesting comparison with the diagram opposite*

the conclusion that no significant excessive stress or strain occurred was fully confirmed by its internal condition. One set of readings does not perhaps allow general conclusions to be drawn, but considering them in conjunction with the rate of starting, which was quite rapid for this size of machine, and general practice after shut-downs of this length, and also after longer periods of shut-down when the run-up is slower, there is good reason for believing that whatever limits the rate of starting at the present time, it operates before cylinder stresses become critical.

There are, in addition, other aspects of casing behaviour, which must be taken into account when running up. Will the cylinder distort during the heating process, or even when heated, sufficiently to cause fixed and moving parts to touch at the glands? Good design endeavours to avoid such distortion. Should it occur sufficiently to cause a touch, the result will be rotor vibration, owing to the uneven heating effect of the touch. Correction of the vibration will usually be obtained by reducing the rate of heating, and then trying again. It should be a characteristic of vibration due to cylinder distortion that the tendency for it to occur will diminish after a number of starts, because each touch will increase the clearance a little and finally allow the distortion to take place without a touch.

It will also be clear from the above observations that it is inadvisable to allow water to lodge anywhere in a cylinder that is going through the heating-up process; neither should shots of water be injected into a hot cylinder. It also follows that the normal thermal expansions, whether radial or longitudinal, should be allowed to take place without serious restraint—this is worthy of an occasional check—and that such external forces as those imposed by steam pipes or other connections should be limited by proper arrangements for flexibility.

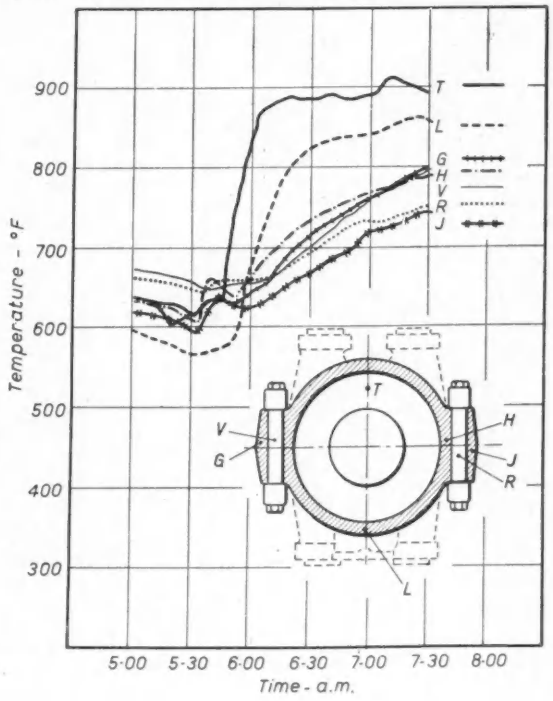
A further consideration, which may be important, is the effect of the air currents in the foundations, and the disposition of lagging, hot steam pipes, etc., on the temperature distribution in the cylinder after a period of cooling. Differences in temperature between the top and bottom of a cylinder of 100° F have been observed due to these causes.

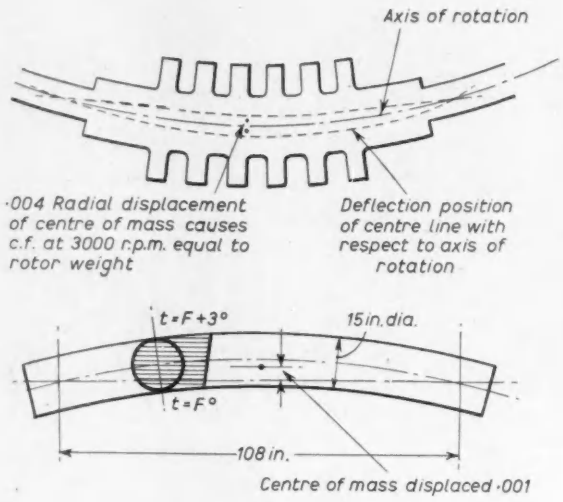
Assuming that a turbine has been nursed as necessary through its early starts; clearances, slide bars, keys, local high stresses, etc., etc., have all settled down; and proper care has been established with regard to water, then cylinder behaviour moves into the long-term category, where it is believed that present starting rates are well within the capacity of modern design, but where there would not, in any case, be any immediate warning signal that the rate of starting was being forced too quickly.

With the rotor it is quite a different matter. If it has any idiosyncrasies it is liable to repeat them at every start. If its behaviour is unsatisfactory, the outward sign is vibration, and, if suitable steps are not taken fairly promptly, the vibration may get out of hand, resulting in a permanently bent rotor and much other damage.

It is important to get a quantitative idea of the problem presented by the rotor. Fig. 4 will help. It refers to a typical high pressure rotor, weighing say 4 to 6 tons, which would operate at a temperature of say 900° F at the inlet end. The top small diagram shows that if this rotor bends so that the centre of mass is displaced 0·004 in. from the axis of rotation, then at 3,000 r.p.m. the centrifugal force produced will be equal to the weight of the rotor. During the run up, of course, there is opportunity for the driver to feel his way towards higher revs, and the curve shows how the displacement to give a centrifugal force equal to the weight of the rotor varies with speed.

*Fig. 3. Metal temperatures during starting (for 50 MW turbo generator)*




Axis of rotation
·004 Radial displacement of centre of mass causes c.f. at 3000 r.p.m. equal to rotor weight
Deflection position of centre line with respect to axis of rotation
t=F+3°
15in.dia.
t=F°
108 in.
Centre of mass displaced ·001

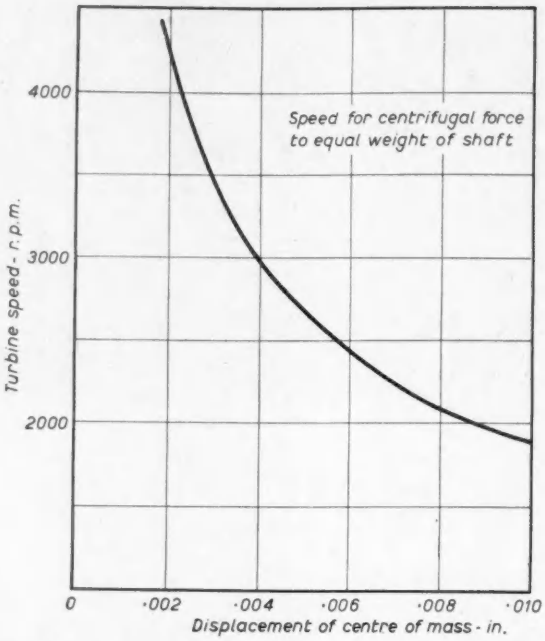



*Fig. 4 (a), above, and Fig. 4 (b), right, illustrate the relationship between transverse temperature gradient radial displacement and centrifugal force as a function of speed against mass displacement*

The lower diagram shows that if a rotor shaft, which is 15 in. diameter and 9 ft 0 in. between bearing centres, experiences a non-uniform temperature distribution such that all along one "side" is 3° F higher than along the other "side," then it will bend so that the centre of the mass is displaced approximately 0·001 in. It is salutary to think of 0·004 in. in relation to 9 ft 0 in. and 6 tons, or 3° F in relation to 900° F.

A very high degree of dimensional accuracy, bearing stability, and uniformity of temperature distribution are essential features of a turbine rotor. Some of these qualities are built into the rotor by manufacturers, but there is one—uniformity of temperature distribution—which is not entirely in their hands.

## *Stationary Bending*

When a turbine rotor lies stationary in a cylinder and no steam is flowing, the temperature distribution depends on the relative rates of cooling of the various parts. It is quite usual under these circumstances for the top of the cylinder to be hotter than the bottom, and consequently the top of the rotor becomes hotter. Inevitably, therefore, the rotor assumes a bend, convex upwards. There is reason to believe that the conditions are sometimes such that the bend is not upwards, but it should be taken as a general expectation that a rotor lying stationary in a hot cylinder will be bent.

Electronic "turbovisory" gear for observing the behaviour of rotors has now been available for eight or nine years, and much valuable information has been collected. Although usually such turbovisory gear is applied to turbines that also have barring gear, there are occasions when the rotors of these turbines are allowed to lie stationary for a short time. On restarting the turbovisory gear almost invariably shows that a bend has occurred. Smaller turbines, up to say 20 MW, may be fitted with neither barring gear nor electronic turbovisory gear, but many of them are equipped with a dial indicator ("thou" clock) mounted on the bearing pedestal so that the probe, suitably extended, makes contact with the shaft at some convenient spot a little removed from a bearing. When the rotor is stationary and also at low speeds, the indicator enables the development or dissipation of a bend to be clearly watched. Such stationary bending is a very significant factor in starting technique. Barring gear, of course, if properly used, completely obviates any trouble from stationary bends. It is most important that a stationary bend is corrected before the rotor is run up to speed. It is undoubtedly the fact that failure to observe this precaution is the cause of a large proportion of bent shaft outages.

The amount of bend depends on the temperature gradient in the cylinder, and the length of time during which the rotor lies stationary. The temperature gradient will have some dependence on the general temperature level, and it follows, therefore, that stationary bends reach a maximum amount fairly soon after stopping, diminishing thereafter as the general temperature level falls. Here is an explanation as to why turbines are often difficult to start after a short shut-down, whereas they can be started up readily after a long shut-down. Where rapid starting is required and no initial barring is contemplated, it is important to prevent unequal cooling of the turbine during shut-down.

Depending on vibration as a guide is not, of course, the best way to avoid vibration due to stationary bending. A dial indicator, mounted as previously described, clearly shows the condition of a shaft at rolling speeds, and, although at higher speeds the oscillation of the finger appears as a blurred sector, it remains quite useful up to at least 2,000 r.p.m. One of these indicators appears on Fig. 1, and it will be worth while referring back to it again.

So far, in building up an understanding of starting problems, it has been concluded that the casing is not a limiting factor, and now a straight rotor ready for the run-up has been ensured. It is not proposed to discuss lubrication, vacuum raising, drainage, etc.: all these services will have received proper attention. Steam is now admitted, the rotor begins to roll, and the warming process has started.

## *Transient Bending*

It is, unfortunately, a well-known phenomenon, well attested by turbovisory records, that a shaft that is initially

running true, will not necessarily continue to do so as speed and temperature rise. Obviously an out-of-balance rotor will give rise to more vibration as the speed increases, but, of course, an out-of-balance rotor will remain out of balance when on load at full speed. It is, however, only transient roughness that is being discussed, and this disappears on load at speed. There is some cause other than initial out-of-balance.

In trying to establish this other cause the difficulty is that there is no instrument which can tell why or where a shaft has bent. All that turbovisory gear can do is to show that the shaft is running eccentrically. However, a large number of experiments and careful study of records and experience lead to the conclusion that many transient bends during running up are thermal in origin. It is necessary, therefore, to seek some condition that produces temperature gradients across transverse planes of the rotor. There is always a temperature gradient along the length of a rotor, owing to the difference in steam temperatures at inlet and exhaust, and heat must be flowing with the gradient. It is, however, possible that the flow of heat into the rotor at the high temperature end is not uniform. This could scarcely be due to the surrounding steam atmosphere, because the speed of rotation is always such that the atmosphere must be effectively uniform. It could be due to varying surface condition, and this is known to have an effect, but it does not appear to be a complete and satisfying explanation. Thought along these lines led to consideration of places where the shaft proper was shielded from direct contact with the steam by a sleeve or shrunk-on wheel, and the heat flow into the shaft had, therefore, to pass across the interface between sleeve and shaft.

Experiments have been made to check this effect, and it has been shown that shrunk-on sleeves are a cause of transverse temperature gradients in the shaft, of sufficient magnitude to cause significant bending. The effect may be very marked if the temperature difference is sufficient to cause the shrink fit of sleeve on shaft to be released.

### *Temperature Difference Criterion*

It will have been observed that deflection due to temperature gradient is dependent on temperature difference, and it follows from this that control may be obtained by attention to temperature difference.

The machine shown in Fig. 1 proved to be free from transient thermal bending limitations, provided the temperature difference between the metal of the inlet belt and the steam entering the steam chest did not exceed 250° F. Where this limit, or preferably something rather less, could be observed, the run-up could be about as rapid as reasonable vigour and vigilance permitted. When starting as a cold machine from a range, it was impossible to keep within the 250°F limit, and the only means open was to reduce the flow of steam to such a quantity that it had cooled to the admissible temperature difference by the time it reached whatever was the sensitive part of the rotor. The quantity and temperature of gland steam could be equally important in this connection.

(*to be continued*)

# SOURCES OF SELENIUM

SELENIUM is one of the "technical" raw materials of which there is at present a world-wide shortage. Its major use is in the manufacture of metal rectifiers, and recently the demand for such rectifiers has been increasing at about 25% per annum. It is against this background that the D.S.I.R. have issued a report reviewing the production and utilisation of selenium. ("Selenium," published by H.M.S.O. price 1s. 6d.)

Although selenium is widely distributed in the earth's crust, there is no known deposit worth working for the selenium content alone. The bulk of the world's production comes from deposits at the anodes during the electrolytic refining of blister copper, although other sources must be sought, none is likely to provide major additions to the supply. The roasting of pyrites for sulphur will give a product containing selenium, but it is not known if this can be removed economically. Certain soils contain selenium, which becomes concentrated in plants growing on this soil up to 10,000 p.p.m. It is just conceivable that a special crop of this nature might be asked for selenium recovery.

No electrolytic refining of blister copper takes place in the United Kingdom. The main hope of obtaining a supply of selenium appears to be the collection of residues from likely metallurgical and other processes and their processing in a central plant. The Chemical Research Laboratory of D.S.I.R. is carrying out a preliminary investigation into the possibility of recovering selenium from sulphuric acid pyrites plants. It has been estimated that the selenium content of pyrites imported into the U.K. is about 37 tons/year and 24 tons are in pyrites to be used in flash-roasting plants. These figures have to be considered against U.K. imports of selenium which peaked at 87 tons in 1950.

Selenium occurring in pyrites (iron sulphide) is concentrated in the wastes, dusts and muds from the roasting plant. In flash roasting the temperature reached is above the melting point of selenium, and it is thought that relatively high concentrations may be found in the gas cleaning section of the plant. Little is yet known of the economics of recovery, but waste materials from three plants have been examined at the Chemical Research Laboratory, and the materials from one plant contain sufficient selenium to justify the hope that recovery would be worth while.

In modern commercial rectifier plates the thickness of the selenium layer is about 0·1 mm. This might be reduced to 0·001 mm. from theoretical considerations, but with present techniques the selenium coating gives trouble due to lack of homogeneity if layers fall much below 0·1 mm. However, research work now proceeding makes it hopeful that with new methods of deposition, a saving of 50% in the quantity of selenium required will become possible.

### *Shortages Hamper Development*

Present shortages in the supply of selenium are hampering the development of new uses for selenium rectifiers. Included in this effect is the export market. Normally one-half of the selenium rectifiers made are exported, and there are indications that the market is by no means saturated. Although selenium is not the only material which might be used for metal plate rectifiers, it is the only one for which techniques exist for manufacture for high efficiency operation. There is hope of rapid development in the use of germanium for such purposes, but the D.S.I.R. report suggests that it is unlikely that any crystal rectifier competing with selenium will emerge for at least five years.

# READERS' VIEWS

*Correspondents writing under a pseudonym are asked to submit their names in confidence to the Editor*

## *Elderly Engineers*

FOR some years, engineering journals have been drawing attention to the problem of the elderly engineer, or executive, or retired officer. Under modern conditions, many of these men, after having spent a life-time in promoting the welfare of others, find themselves reduced in circumstances, with consequent loss of status as well as loss of adequate remuneration.

Whole-time work is not necessarily the complete answer to the problem of the retired engineer; and, in the belief that a worthy object such as this should be the concern of a corporate body, a few Chartered Engineers in good standing have formed "The Association of Retired Industrial Executives," for three important purposes: (1) The employment, part-time, of retired executives. (2) The supply of pre-digested information for industry. (3) The use of collective creativeness, in the form of a Guild of Inventors.

Efforts made over many years by Mr C. E. R. Sams, past president of the Old Centralians, extended to the provision of whole-time employment for engineers; but executives or any others with electrical engineering or administrative skills would be welcome; and might find interest as well as possible part-time remuneration in keeping in touch with the flow of vitally important information which bears upon their own technological experience.

Such an Association would have local branches, the existence of which would provide opportunities for social occasions, lectures, discussion groups, collective approach to local industries, and the organisation of educational guidance and selection methods for the coming generation. Branches abroad could assist the export firms by market research and sales promotion; wherever English is spoken we could have a high quality part-time expert, constantly in touch with the London Headquarters.

Further information will gladly be sent on request, preferably accompanied by a self-addressed envelope, and loose stamp, or reply-coupon from readers abroad.

*G. W. Williamson,*
139 STRAND, W.C.2.

## *The Cost of Compound*

THE article by Mr A. King, "Filling Compound for Power Cable Accessories" must have been read with much interest by many Electrical Engineers responsible for the distribution of Electrical Power and I was particularly pleased to read in Part I that increasing realisation of the importance of filling compounds has led to their receiving consideration on an international scale.

There is one point, however, over which I find myself in disagreement with Mr King and that is his contention that an asphaltic (petroleum) bitumen compound is not normally recommended for voltages above 11 kV. It may be, of course, that the compound B referred to in his article is, for some special reason, unsuitable for voltages above 11 kV, but compounds of asphaltic petroleum bitumen base have been in constant use in cable joint boxes and in other electrical apparatus on voltages up to and including 33 kV for the last 30 years.

Mr King has, throughout his article, made clear the very real need for close control of production by the laboratory even on compounds for use on voltages up to 11 kV. In some ways it seems a pity that the old categories of low, medium and high voltage have been discarded; 3·3 kV and 6·6 kV are voltages susceptible to the influences of stresses set up by the effects of short circuits, by switching phenomena and by sudden changes in the steady-state load and even compound filling low voltage over-head line boxes can be severely stressed or broken down following a lightning stroke on the line, which may not have tripped out quickly enough, depending upon the time-lag of voltage and the time-lag of the dielectric. Now that so much gear for high voltage work is tested for impulse voltage value, it is, I suggest, no less important that the filling compound therefore should also be so tested.

In an article such as Mr King's, one would not expect him to refer other than to technical points which emphasise the importance reputable manufacturers attach to the production of filling compounds. There is, however, a tendency at the present time for them to be bought on price alone and even if the physical specification indicates a cheaper compound to be similar, there is a great deal more in making a reliable compound than simply in complying with a physical specification.

Specialists in compound production put a great deal of painstaking laboratory work into their products, the cost of which must be included in the price and the difference in price between a cheap compound and a slightly dearer one is the user's guarantee of safety in service. Filling compound is a vital component of the vast and complicated apparatus for distributing electricity and the least expensive; its failure for an initial saving in price of a few shillings or evens pounds per ton, can cost thousands.

*E. A. Deacon,*
Associate Director.
DUSSEK, BITUMEN & TAROLEUM LTD.

## *Dabblers*

I HAVE read Mr Gazard's letter in reply to my previous one in your issue of the 9th inst. on the above subject and whilst he admits he agrees with me he still argues that our amateur should be encouraged but make him confine his activities to his own household. What a hope!

Exactly seven days ago, at a house not 1½ miles from where I am writing this letter, a 38 year old woman lost her life through taking an old, faulty, dilapidated, one-bar radiator into a cellar. The radiator was fitted with a length of shoddy, frayed, twin flex, the live strand of which was in contact with the frame of the radiator making it alive. The flex was connected to a 3-pin plug top and plugged into a 3-pin socket in the living room. The length of the flex permitted her to carry the radiator down the cellar steps which were wet near the bottom and the shock she got made her helpless. She fell on to the radiator with her face on the live bar with the result that death ensued through "electric shock and burns on the face".

Now does Mr Gazard still agree with dabblers and amateurs doing electrical work even if they confine their activities to their own homes. The case stated, as you will already have guessed, was a dabbler's job in the home.

Yes, Mr Gazard, compulsory registration would help to remove the evil and I still hope to see this come about. You say it is only a dream in England, but it has been known for dreams to come true. Let us hope, shall we?

*Harry Moss,* M.I.E.E., F.I.F.S.,
BRADFORD.

*(This correspondence is now closed. Ed.)*

*With the Mayor above are Messrs E. C. Lennox, E. Howard, C. Gordon, the President; N. Boydell, H. Carpenter and H. F. Cork, as he welcomes delegates*

# A.P.L.E. Diary

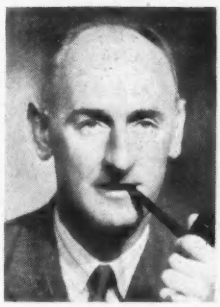
## *AN ACCOUNT OF THE WEEK'S PROCEEDINGS AT EASTBOURNE CONFERENCE*

WHEN the Association of Public Lighting Engineers' Conference came to a close on Friday, after a crowded week of technical sessions, lively discussion and convivial social events, the impression, already recorded in our first report in last week's issue, of the similarity between this conference and that at Harrogate two years ago was even more marked. Of the conference's remaining papers, two dealt with electric street lighting control and the modernisation of out-of-date gas installations, subjects discussed previously at the 1952 meeting. The concluding paper re-introduced the opening theme of street lighting in relation to road accidents (which had also received attention at Harrogate) but continued to discuss the important, and somewhat neglected topic of road surface characteristics.

Following Mr Robinson's paper, which, it will be recalled from our report last week, concluded by urging a concentrated effort to improve existing traffic route lighting, with immediate attention being given to that at junction and cross roads and an improvement in the night-time effectiveness of pedestrian crossings, a lively discussion ensued ranging from financial aspects to bad driving. Opening, Mr E. C. Lennox (North Eastern Electricity Board), reminded his audience that British scientists and engineers had produced excellent light sources and fittings, whilst the principle of street lighting expounded at conferences of the Association had been adopted throughout the world. For this reason, the problem of road safety was largely outside the realms of scientists, requiring money and opportunity to solve it. Some £50 millions, he estimated, was spent by the nation in respect of road accidents at night and he felt that the Association should express itself in such a way that the sum would be diverted to the use of public lighting engineers. Continuing this financial theme, Mr F. H. Pulvermacher (South Wales Electricity Board) pointed out that of the total cost of road accidents, some £25 millions could be saved annually if 900 lives were saved by adequate street lighting. At present about £9 millions was spent on this work, which would be worth doubling to save £25 millions.

Wednesday's notable event, the Annual Luncheon, took place in the Winter Garden. In proposing the toast to the Association, Sir Roger Duncalfe, President of the British Standards Institution, reviewed the progress seen in public lighting during this century, stressing that there was still room for improved techniques, with further research and better standards which stem from that research. Associated with this development was the appalling problem of road safety, and the efficient lighting of roads. Deciding the quality and type of installation to be used was an engineering problem involving all road features, which could only be solved on the spot by qualified engineers. The Code of Practice for lighting traffic routes was available, however, to assist the engineer, whilst the second part, dealing with other roads, would also be ready in a few months.

Replying, the President commented on the size of the British Standards Institution, there being within its framework, no less than 2,400 committees involving 14,000 people. The Association was represented on 11 of those committees, of which one of the most important was that concerned with the Code of Practice for Streetlighting Installations. Earlier, Mr N. Boydell had, in a speech which well illustrated his past association with Eastbourne, ably proposed "The Guests," to which the Mayor of Eastbourne made reply.



B. C. OSSITT

### UNUSUAL FLUORESCENT INSTALLATIONS

RECENT years have seen a considerable number of fluorescent street lighting installations which employed almost revolutionary methods of lamp and lantern mounting. Normally, lanterns containing up to seven lamps, are mounted horizontally on columns, with their axis perpendicular to the road. Although the night time result—wide bright streaks on the road, with even surface brightness and good revealing power—has conformed with generally accepted standards of good lighting, many such installations offend in their daytime appearance. To overcome this difficulty other mountings have made their appearance, with lamps arranged vertically, either column or wall mounted, and lamps arranged horizontally, but mounted with their axis parallel to the road.

In a paper devoted to describing these installations, B. C. Ossitt (Lighting Engineer, E. Sussex and S.W. Kent Sub

Area, S.E.E.B.) rested his case for their adoption on two main factors, the character of the street and the under pavement congestion usually found in old city streets, although lack of pavement space has been a third reason for its use. Of the four categories outlined above, that of vertical column-mounted lanterns was illustrated by the installation in Devonshire Place. Here the roadway is essentially of the boulevard type, 60 ft in width, a 10 ft grass verge with ornamental flower beds, and a 10 ft pavement on each side bounded by good class hotels. Although carrying only comparatively light traffic its position and character sufficiently warrant a good standard of lighting, whilst the unsuitability of all conventional schemes, due to the intrusion of too many lanterns and columns, called for something unorthodox. Other installations employing fluorescent lamps in this fashion, in Birmingham and Liverpool, have proved not only satisfactory, but have provided a street lighting feature of originality.

Wall-mounted lanterns, with their light source parallel to the road, provide an instance of utilising both direct contrast and silhouette vision. Several such installations are now in use, the first being South Street, Eastbourne, where the trial installation of single 80 W lamp lanterns in Eastbourne, commissioned in 1950, laid down the basis for most of the succeeding schemes. Another locality employing this type of installation, but using lanterns designed for two 80 W lamps, is that of Richmond, Surrey, where narrow pavements were the main factor in deciding upon this system. A variation is seen at Harlow New Town, Essex, where the installation of the neighbourhood unit is undertaken by twin 40 W lamp fittings mounted 23 ft high and spaced alternately at 18 ft intervals.

Wall-mounted lanterns in which the lamps are arranged vertically are now becoming popular since the first notable installation in this country, that in King Street, City of London. Here the mounting height is 22 ft, with 90 ft spacing, generally staggered, this method having been chosen because of the window arrangement leaving little space for horizontally arranged lanterns. A further example of this type of mounting is provided at Aberdeen, where the character of the roads and buildings, as in London, demanded a special approach.

A. V. HORSFALL
A.M.Inst.Gas E.

## IS GAS CHEAPER FOR SIDE STREET LIGHTING?

IN his paper "Further details on a Wise Compromise in Street Lighting," Mr A. V. Horsfall, A.M.INST.GAS.E. (Sales Manager, West Midlands Gas Board) continued a discussion started at the Harrogate Conference two years ago by Mr Hudson, who advocated the modernisation of old gas installations in side roads, rather than go to the greater expense of converting to electricity. Whereas Mr Hudson spoke only with reference to a particular installation, Mr Horsfall, at Eastbourne last week, had prepared comparisons of conversion costs for traffic-bearing roads both greater and less than 35 ft wide between kerbs, and residential roads. In each case, the capital costs of modernising the old gas installation as against converting entirely to electricity, were set out in some detail, showing gas to be cheaper.

In the ensuing discussion, however, only two of the eight contributors declared their support for the paper. The first was Mr N. R. Junkison (North Thames Gas Board) who, in opening, pointed out that a modern gas lantern gave 88% more light on the road surface with no increase of fuel. Mr J. Wilson (Paisley), however, straightforwardly declared his belief that the days of gas lighting were over. It was Mr E. H. Jesty (L.E.B.) who was the first to point to the omission of running costs, declaring that the saving in running costs brought about by converting to electricity, went far towards covering the capital costs of conversion. In his support came Mr J. T. Kilner (Prestwich), who stated that he was in the process of converting some 500 gas lamps to electricity, which at a capital cost of £33/lantern meant repayment at 43s./year. Running costs, however, would be some £22. 5s./lantern cheaper each year as a result of the conversion to electricity, which meant that the conversion was saving him some £20/year for each unit.

A. J. OGLE
B.Sc., A.M.I.E.E., F.I.E.S.

## STREET LIGHTING CONTROL

ALTHOUGH the subject of controlling electric street lighting had been dealt with in a paper at the Association's Conference two years ago, this new paper, by Mr A. J. Ogle, B.SC., A.M.I.E.E., F.I.E.S. (North Eastern Electricity Board), provided a useful guide to the many possible systems available. Hand control was discounted entirely, due to its high cost, apart from the one advantage that the twice daily attention results in speedy attention to faults. Also discounted for reasons of high cost were hand wound time switches. Of the types of automatic time switch available, the frequency controlled, synchronous motor-driven type offers, with modern supply stability, the most advantages although is at a disadvantage if d.c. supplies are to be controlled. The two other types—escapement controlled, with an electrically wound clock and spring reserve, and frequency controlled, synchronous motor driven with spring reserve—although obviating the drawbacks due to supply breakdown, are considerably more expensive.

For many purposes, however, group control from a single time switch provides a simple and inexpensive method where lamps are to be switched on and off at one time only. Such methods, however, suffer from the disadvantage that a failure plunges the whole group in darkness. To complete the range are the two forms of remote control. One is based on a.c. impulses and is, therefore, suitable for injection into the h.v. side of a complete urban system. The other, employing d.c. impulses may only be installed at substations, although each injection unit may be controlled through pilot wires from a centralised point.

Concluding Mr Ogle was of the opinion that in deciding future policy there was little doubt that, from an installation and maintenance point of view at least, there is a strong case for controlling lamps in groups by the simplest of all means. This was a straightforward service from a low voltage main, including the provision of a public lighting switch core wherever the main was buried or provision for a switch wire whenever an overhead low voltage network is erected near a public highway. It should, nevertheless, be borne in mind that the method of individual lamp control by time switches had no economic restriction as regards the number of lamps to be controlled. He also referred to the use of centralised control systems.

A. W. CHRISTIE M.A., B.Sc. (left)

A. J. HARRIS B.Sc. (right)

## ROAD SAFETY AND ROAD SURFACES

THE final paper at this year's Conference "Research on Two Aspects of Street Lighting: Accident Statistics and Road Surface Characteristics," by A. J. Harris, B.SC., and A. W. Christie, M.A., B.SC., of the Road Research Laboratory, reintroduced the earlier topic of road safety. The first section set out to answer two questions—by how much darkness increases the night accident rates and, therefore, by how much might street lighting conceivably reduce them; and the effect of street lighting of an up-to-date standard actually has on night accident rates. Estimates of the effect of darkness can be obtained from investigations in which accidents occurring during some period which is light are compared with accidents during a corresponding period which is dark. Such periods are provided by the gradual lengthening and shortening of the day and by the sudden change in the hours of sunrise and sunset at the beginning and end of summer time. When possible, the effect of traffic differences is reduced by comparing accident rates per vehicle mile rather than the number of accidents, although this does not take pedestrian flow and traffic composition into account.

From 1953 figures for fatal accidents published by the Ministry of Transport, the average monthly number of fatalities for a particular hour after dark was divided by the corresponding number for the hour when light. For built-up areas, the ratio for fatal accidents in the evening hours in which most night accidents take place is 1·88 and if such be representative it should be possible to reduce the fatal evening accidents by about 47% by improving visibility.

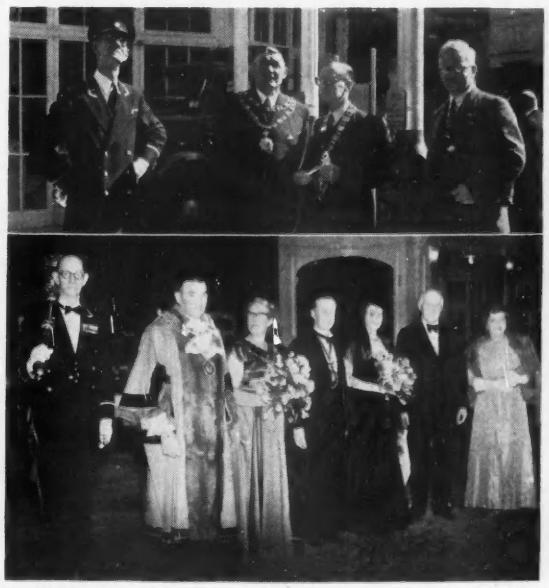
It has, however, proved impossible to estimate the effect of good street lighting in offsetting the effect of darkness. The lack of sufficient information makes it impossible to relate the accident levels of well lighted, and poorly lighted streets to the daylight level. A study of eight relighting schemes near London, however, showed that overall, the night to day ratio of accidents had fallen after relighting, and it is estimated that the lighting reduces the accidents at night by about 30%. A second comparison, between 13 well lighted and 21 poorly lighted towns, showed that the night-time casualties in the former were some 10% less than those in the latter.

### *Road Surface Characteristics*

Further work at the Road Research Laboratory has been directed at investigating the reflecting characteristics of modern road surfaces, such data having a considerable importance in lantern and installation design. Although a comprehensive picture of a surface's characteristics may be built up by measuring its luminance factor for different angles of incidence, reflection and azimuth, it has been found that the luminance (brightness) of the road surface, when illuminated by a typical lamp and viewed from a suitable distance provides means of setting out the main features of the reflection characteristics. The typical patch of light seen in perspective takes the shape of a capital T, the head across the road and the tail towards the observer.

A comparison shows that surfaces differ markedly in the length of tail and, to a lesser extent, in the width of the head. Surfaces appearing similar in the head may have tails considerably different in length — peculiarities obviously bound up with the nature of the surface. In general the texture of the surface, whether fine or coarse, matters little in dry weather, when the shape of the features is more important. In wet weather, however, on surfaces which are either even or composed of fine peaks, bright patches soon degenerate into narrow streaks. On coarse peaky surfaces this stage is rarely reached and patches remain wide if the texture depth is greater than 0·013 in. Further analysis of dry weather characteristics shows that the tail of the patch is practically independent of the road colour, the shape of the surface features determining the luminance. Peaky surfaces tend to give a shorter, wider tail, due to the number of reflecting elements directing light away from the observer. These surfaces, however, are preferred for their anti-skid properties, which gives rise to the conclusion that for such roads, high angle beam lanterns are unwise, although medium angle lanterns should give good results.

*At the Induction Ceremony the President receives his chain of office from C. C. Smith with E. Evans (the Secretary) on the left and J. M. Waldram (Vice-President)*



*The Mayor and President at the outdoor exhibition and (lower) the Mayor and Mayoress, the President and Mrs Doxey, and Sir Roger and Lady Duncalfe at the Civic Reception*

# International Electrical Standardisation

## VARIED ASPECTS STRESSED AT JUBILEE CELEBRATIONS

LAST week there was concluded in Philadelphia the Golden Jubilee meeting of the International Electrotechnical Commission. In our issue of 16th September we reviewed the activities of the meeting, and noted the speech of Lord Waverley, the chief British delegate, during the jubilee celebrations. But Lord Waverley was only one of four main speakers on that occasion; and there were important supporting addresses in addition. These are summarised in the present article.

Before proceeding to the speeches, however, note may be taken of a new I.E.C. feature. This is the Le Maistre Memorial Lectureship, whose establishment in memory of the man who was for so long Secretary General of the Commission, was announced on Jubilee Day by Dr P. Dunsheath. The object of the lectureship had been summarised by Mr P. Ailleret (France) immediately before when he said of Mr Le Maistre: "He, who as Secretary General of the I.E.C. unobtrusively guided its policy with a sure hand for 50 years, thought a great deal about standardisation methods." It was fitting that the Le Maistre memorial should have for its objective, help in developing a general doctrine of standardisation methods. Mr Ailleret hoped that the successive lectures delivered within the framework of the memorial would have the greatest repercussions, and would contribute to the development of the I.E.C. spirit necessary to the effective outcome of electric standardisation.

Mr Ailleret was lecturing on "Fifty Years of Standardisation in the Electric Power Field," and he instanced as the outstanding example of the success of such work the universal usage of the same electrical units. Frequency standardisation was the great failure, and it taught a lesson of the need to be alert to avoid similar situations in the future. He went on to discuss in more detail the rate at which standardisation should be introduced. Each new element of technique should be standardised before the various countries definitely crystallised their practice, but not before sufficient use had permitted a clear impression of the trend of developments.

All the work of international standardisation, suggested Mr Ailleret, would be greatly facilitated if the principles of standardisation were laid down more clearly, and taught in the universities and technical colleges. There were few, if any, publications which answered the need of young engineers with a critical approach for information on the basis of standardisation.

Now that more countries were participating in international standardisation work, care was necessary to avoid allowing the efficiency of such work to be affected by the greater number of people involved. International standardisation was only accomplished through reciprocal concessions. A country's contribution was not measured by the fact that its representatives were brilliant, but by the efforts which they made to arrive at general agreement.

The day's proceedings had been opened by the President of the I.E.C., Dr H. S. Osborne, who had expressed the opinion that there was probably as great a degree of international understanding and agreement in the field of electrical science and industry as in any field of human activity. He went on to review briefly the general history of I.E.C. Coming to the present day, he stressed that many I.E.C. publications which had been completed before World War II were now out of date, and were being actively revised by the appropriate technical committees.

The companion lecture to that of Mr Ailleret was delivered by Dr H. A. Sterky, of Sweden, under the title "Past, Present and Future Telecommunication Standardisation."

An overall review of the pure science basis of electrical engineering was given by Dr L. A. Du Bridge, President of California Institution of Technology. He showed in some detail how Maxwell's fundamental equations provided the basis for several branches of technology, each branch having superficially quite different engineering practices. This was the reason, he suggested, that the more forward-looking engineering colleges were increasing their emphasis on fundamental principles of physics, even at some sacrifice of practical experience with currently useful machines and equipment. Sooner or later, the engineer working on advanced development always had to return to basic principles to solve some new problem which his handbook did not treat.

D. G. Mitchell, an industrialist, delivered an address to the meeting on the general relation of standardisation to international progress. Admitting that in the beginning international standardisation was conceived as an aid to foreign trade, he claimed to see in it something more fundamental, the reduction of differences between races and nations. To most businessmen standardisation was like religion—while definitely desirable, it was nevertheless an abstraction. It was only when viewed in its relation to the welfare of people that it became vital and dynamic.

At an address given earlier during the meeting, Mr R. L. Gray, President of the American Standards Association had pointed out that the U.S.A. was not the great leader in international standardisation that many imagined it to be. He believed, however, that U.S. industry was realising now as never before the value of international standards.

## SMOKE REPORT SOON

THE Air Pollution Committee has virtually finished its report and will be very shortly presenting it to Ministers. This was stated by Sir Hugh Beaver, the chairman, in the course of an address delivered yesterday to the National Smoke Abatement Society at its annual conference at Scarborough. Although he could not, of course, reveal the contents of the report, he said that nothing his committee had heard or saw in the course of the past year's intensive study and investigation had shaken their conviction in the general statements made in the interim report already published. He went on to emphasise the importance of exciting public opinion to be active, if curative action were to be taken in the matter of air pollution.

Earlier the Society had heard its President, Sir Ernest Smith, reviewing achievements of the fight to reduce pollution. He gave close attention to research, and went on to discuss the Society's influence on various improvements aimed at reducing pollution. He said that the Society was limited by the smallness of its annual budget, but it hoped to get substantial Government support. He thought that with an income of £20,000 per year instead of 5 or 6 thousand a year, wonders could be performed in education and propaganda.

# notes on wiring

by Megohm

I RECENTLY met a retired electrician who, some fifty years ago, was engaged in wiring houses in the now almost obsolete system of capping and casing. At that time conduit, lead-covered and tough-rubber-sheathed systems had not been thought of. I was rather amazed by his statement that he had been recruited from his original craft of joiner to the ranks of the new trade "electrician."

When this system was in vogue, most of the installations were being carried out in large mansions and it was in these places that the "joiner-electrician" showed his skill. The capping and casing had to conform to the contours of architraves, cornices and other embellishments which abounded in these period mansions. Some fine examples of this system still exist, which reveal the high craftsmanship of the workmen of those days, and I myself am familiar with one or two offices in the heart of London where this type of system is still in perfect working order.

## *Tools for the Job*

I.E.E. regulation 1 states "Good workmanship is an essential requirement for compliance with these Regulations," and this is supplemented by Electricity Supply Reg. 27 (a) (i) which makes it clear that conductors, apparatus and the like, must be *installed* so as to prevent danger. The choice of materials, layout of the work, *skill* and *experience* all combine to determine the character and efficiency of the installation.

There are many tools on the market today which assist the operative in his task. For steel conduit systems there are conduit screwing machines and these are particularly useful on large installations where a considerable amount of large conduit is being installed. Such a machine, sited in a convenient place, can keep the work flowing smoothly. Of course, there is that old proverb about being able to judge a workman by his tools and these screwing machines require careful handling and maintenance to keep the conduits free from stripped threads. I have, on occasions, seen these machines such a mass of grease, oil and cuttings that I had fears of the installation being absolutely perfect.

The usual method of bending conduit is either by the use of a bending block or round the leg just under the kneecap. I have rather painful memories of the latter, and much preferred to rely on a nice piece of ash about four feet long and 4 in. by 2 in. with suitable holes drilled therein to do the job. It is really pleasing to watch someone who has had years of experience in the art of setting conduit by this means, and there are many of the old hands who today shun the modern bending machines. There is quite a range of these bending machines available now, from the smaller type for $\frac{5}{8}$ in. and $\frac{3}{4}$ in. conduit to those for the larger conduits up to 2 in. diameter. There is one machine for use with the smaller sized conduit which I feel is a great boon to the contractor engaged on small installations. There are few loose parts to go astray and the bending formers are ganged in one casting so that the machine is always complete in itself irrespective of the diameter of conduit being bent. It has also the advantage that it can be operated without attachment to the bench—quite a consideration on certain jobs—and the weight is only $14\frac{1}{2}$ lb.

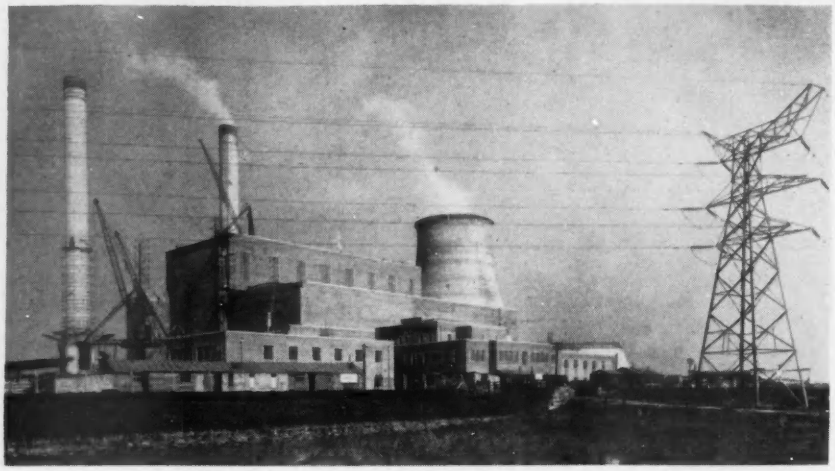
There are many other useful aids to assist the electrician today, including hole cutters for use on conduit boxes, etc. The familiar ring saws are in everyday use but, of course, have their limitations. There is the other type of cutter which is capable of giving more robust service but is not always so convenient in use. When fitting immersion heaters in tanks a useful tool to have handy is a tool referred to as a universal hole cutter which can cut holes up to 5 in. diameter. This eliminates the need for a large range of tank cutters. Replacement blades are inexpensive.

I see the need for a tool to really tighten up a ring bush in a loop-in box has been attended to. The tool I have seen assists greatly in this matter and is easily operated. It may prove too expensive for the electrician to buy for his personal kit, and I doubt if contractors will supply their men with them, but it is an asset on any steel conduit installation. There is also on the market a double-ended bush spanner which tightens male bushes in a most satisfactory manner without damage to faces of the bush.

## *Other Systems*

Other systems of wiring require special tools, in particular the aluminium conduit and mineral insulated metal sheathed cable systems. For the former, special attention must be paid to the dies. These should be of the self-clearing pattern to prevent clogging and have a considerable top rake on the cutting face. The back face should be radial to allow cutting to take place when backing out. When threading this type of conduit a lubricant consisting of high-grade mineral oil and paraffin should be used and soluble cutting oils avoided because of the resultant alkaline reaction. Setting is quite easy provided care is taken to avoid kinking the conduit. There is also a light, portable bender for small aluminium conduit. The bender for larger sizes is of the type which requires fixing to a bench. With the m.i.c.c. cable system there is, of course, no need for a bending machine, bends and sets being formed by special hand tools. The bender is somewhat similar to the "hickey stick" and has the rubbing surface faced with leather to avoid damaging the sheath. The faces of the setting tool are similarly faced with leather. There is also a "ringing" tool to mark the sheath prior to stripping the sheath. A stripping rod can be fabricated from a piece of mild steel with a slot at the end and used in the same manner as the familiar sardine tin opener.

I well remember the small piece of hardwood with rounded corners which rested in my kit for use in straightening lead-sheathed cables. I see that some operatives still have a similar block, but I understand that it is not so effective on the softer lead-sheathing in use today. It is, however, useful for m.i.c.c. cables. For the smaller sized aluminium sheathed cables up to $\frac{1}{2}$ in. diameter there is the bending tool, which gives the permissible bending radius, and straightening tool, both of which assist in fulfilling the first Regulation of the I.E.E.



# Connah's Quay

CONNAH'S Quay Power Station, North Wales, was officially opened last Thursday by the Chairman of the B.E.A. the Rt. Hon. Lord Citrine. Situated in the County of Flintshire, the site is 4 miles from Flint; 8 miles from Chester. The power station, originally envisaged by Chester City Council, was to be of 60 MW capacity, replacing the existing small station at Queensferry. However, following vesting day the B.E.A. took over and since the electrical load for the North Wales area was increasing rapidly, it was decided to extend the planned capacity to 180 MW, to be attained in three stages, 60 MW at a time, completing in 1957. Each stage comprises the installation of two 30 MW turbo-alternators, each with its associated unit boiler rated at an output of 300 klb/hr together with the necessary ancillary gear.

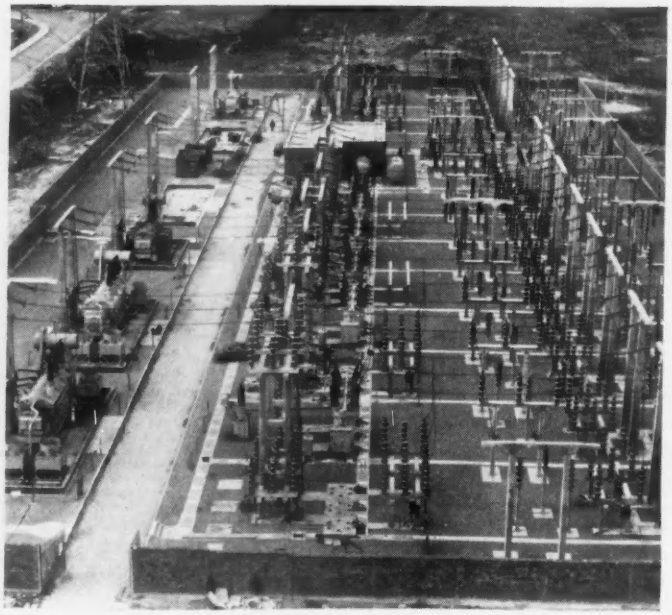
## *Site and Building Features*

Following aerial and ground surveys and a study of local amenities it was decided to reclaim an area of 70 acres of salt marsh. This work was undertaken by dredging and pumping sand from a suction dredger located 1 mile from the site. A series of bunds were build around the site, 4 in. of topsoil was removed from the saltings and stored and in nine weeks 800,000 tons of sand had been deposited to a depth of 8 ft raising the general level to 22 ft above ordnance datum. The 4 in. topsoil was then replaced. Great difficulty was encountered in driving the 5,100 piles which were required for the complete building and Nos. 1 and 2 cooling towers. These piles of precast concrete, were each 14 in. square by 15 or 30 ft long and, set approximately 3 ft apart, support 60 tons each.

The main building is of steel framed construction, with main stanchions and girders in 28 ft bays, mounted on beam and slab construction over the pile caps. Initially designed to house four of the six 30 MW sets it is estimated that 5,400 tons of steel will eventually be required, and finally it will contain 6 sets. With 14 in. thick walls in most places and "Lenscrete" windows, the building embodies latest design features, the roofs being of hollow precast reinforced concrete with one inch cork insulation and felt and asphalt waterproofing. The two chimneys, each having a total dead load of 2,700 tons, stand 300 ft high.

An electric low temperature floor warming system has been installed for heating the administrative offices, canteen, workshops and control room. This was supplied by Panelec (Gt. Britain) Ltd., and has a total load of 305 kW. Temperature is thermostatically controlled.

*Elevated view of 132 kV substation showing generator transformers. Cables from the power station are conveyed through a tunnel to the enclosure*



## *Turbo-alternator Plant*

Two of the six 30 MW Parsons turbo-alternators have already been commissioned. Each set comprises a reaction type twin-cylinder machine having duplex exhausts. They operate at a speed of 3,000 r.p.m. and have an economic rating of 24 MW. The alternator is of the totally enclosed ventilated type and is driven through a multi-claw, semi-flexible coupling. Operating steam conditions on the turbine are 600 lb/sq in. and 850° F at the stop valve. From the low-pressure cylinder steam, is exhausted to condenser capable of maintaining a vacuum of 28·7 in. Hg at the economic rating, cooling water inlet and outlet temperatures being 65° and 87·5° F respectively. Two electrically driven extraction pumps installed, are each capable of handling the full quantity of condensate. The vacuum in the condenser is maintained by two 100% duty steam operated, multi-stage air ejectors are supplemented with a single-stage quick start ejector, capable of creating a vacuum of 20 in. Hg in 4 minutes.

At 30 MW, bled steam at pressures of 154, 58·2, 15, and 5·1 lb/sq in. is bled to four feed water-heaters, the temperature of final feed water on leaving the No. 2 high-pressure heater is 345° F. Boiler feed pumps are positioned between the second and third heaters, and a shunt de-aerator is fitted into the feed system to ensure a supply of de-aerated water for make-up.

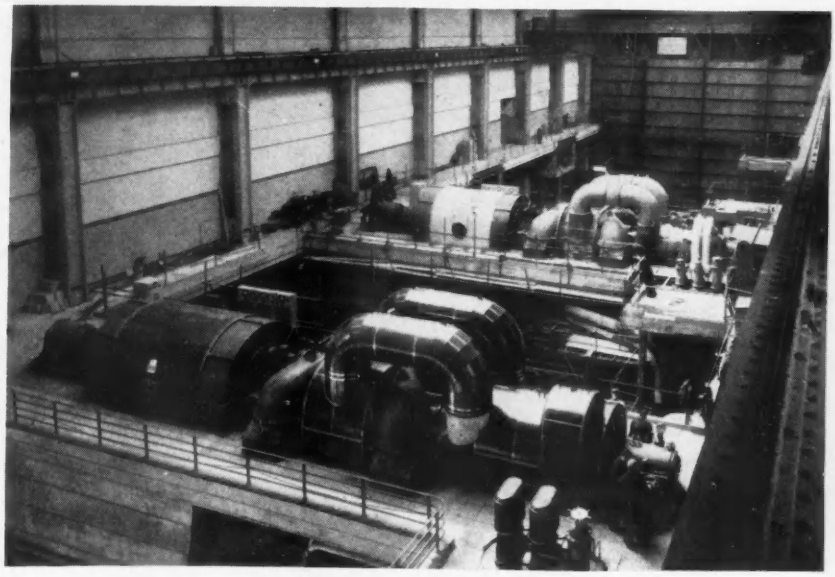
*The auxiliary switchgear house contains 3·3kV air-break switchgear and 415V distribution gear*

## *Boiler Installation*

Ultimately there will be installed six International Combustion Lopulco water tube type boilers each with a steaming capacity of 300 klb/hr at a pressure of 625 lb/sq in. and 865° F fired by pulverised fuel. The complete steam raising unit including the economiser and air-heater is supported on structural steelwork which is carried from the basement level completely independent of the building structure. The boiler, of the tri-drum type, each drum being of hollow forged steel construction, employs 3¼ in. diameter tubes, as does the furnace. The finned tube construction consists of two one-inch wide fins welded diametrically opposite each other. Water cooling is employed for the furnace chamber and front, sides and lower rear walls are of fin tube construction. The welded superheater maintains automatically a final temperature of 865° F within the ± 15° F over a load range of 80 to 100% rating of the boiler by means of tilting burners. Each boiler will be provided with two forced and two induced draught fans, the former drawing air from above the boiler inside the boiler-house in order to provide a measure of reclaimed heat. Flue gases from the boiler pass to a Sturtevant electrostatic precipitator arranged in two independent sections thus allowing one half of the plant to be shut down for maintenance.

## *Coal and Ash handling*

Some 10,000 tons of coal a week will be consumed at the station when it is completed. Sidings have been provided for coal brought in by rail, and in addition road borne coal can be accommodated. Inside the boiler house, coal is discharged into small hoppers feeding two shuttle conveyors which are capable of serving the three hoppers of each boiler bunker. From the bunker outlets, coal is fed through chutes down to the Lopulco coal grinding mills of which there are three for each boiler. During the grinding process hot air is used to dry the coal, and then is used as the primary air to the burners. Four pulverised fuel



*The turbine room showing No. 1 set completed and No. 2 in final stages of erection*

*Piling in hand. This picture shows the hazardous conditions which contractors experienced during the winter of 1951. Below, discharge pipes from a dredger located one mile from site in lagoon on Cheshire side of estuary*

burner boxes are provided, one in each corner of the combustion chamber and each is complete with three burners so that with tangential firing, high turbulence in the furnace is obtained.

The ash and dust discharges from the respective hoppers at the bottom of each boiler and precipitator into sluiceways which run lengthways throughout the station under the hoppers—each sluiceway accommodating three boilers. Two Gwynne 115 h.p. sluice pumps drive the ash and dust to the swirl pit, where the sluiceways converge. Three Gwynne ash slurry pumps rated at 150 h.p. each then discharge the slurry at a rate of 3,300 gallons/minute through a pipeline to an open culvert 36 ft above general ground level. From there the slurry is allowed to slide gradually down the ash launder, as the culvert is termed, to an ashing area which will suffice for two years. It is estimated that sufficient low lying land has been obtained to accommodate dust and ash disposal from the station for 20 years.

## *Circulating Water*

To condense the exhaust steam from the turbines each turbo-alternator requires 19,500 gals of water per minute to pass through its condenser. Water is drawn from the cooling tower ponds via twin open rectangular culverts which connect to the pumphouse. Six Sigmund pumps will be installed in the pumphouse each having eventually a capacity of 21,000 gallons per minute. These will discharge to twin ducts which run underneath the whole length of the turbine house. Each condenser has an inlet connection from each of the ducts and an outlet connection into each of the two discharge ducts which return the water to the cooling towers. Supplies of make-up water for the cooling towers and for the ash dust sluice water are drawn from the River Dee at low ebb-tides, at this time the salt content is at a minimum. Three vertical pumps, made by Gwynnes, rated at 4,000 gals/minute are used for this duty. A Wallace and Tiernan chlorination plant is installed to eliminate slime-forming growths in the condenser tubes and the growth of marine organisms in the circulatory water system. The plant has a capacity of 3,000 lb of chlorine for each 24 hours continuous rating.

Permutit "Deminrolit" plant is use to treat the water obtained from Connah's Quay Urban District Council to obtain the high degree of purity required for the boilers.

## *Transformers and Switchgear*

The generators are connected to the 132 kV system through 36 MVA Parsons 11·8/132 kV generator transformers situated in the switchgear compound. The transformers are of the forced oil/air blast type, there being two 100% coolers for each unit. "On load" tap changers are fitted. Ferguson Pailin supplied the 132 kV switchgear which is of the bulk oil type, and has a rupturing capacity of 2,500 MVA. Accommodation is provided for six generator units, two station transformer units, and eight feeder units, together with busbar coupler and busbar section switch units. Six feeders, all of the overhead line type, are to be installed in the current installation.

Electrically, each turbo-alternator and boiler is operated on the unit principle, and essential supplies for auxiliaries are drawn from unit transformers directly connected to the alternators. Other station supplies and non-essential auxiliaries are obtained through 5 MVA 132/3·3 kV transformers of the naturally-cooled type and Reyrolle 3·3 kV air break switchgear is used for the distribution. Auxiliary switchgear at 415 V supplied by Reyrolle is of the air-break switch-fuse type.

Separate but adjacent rooms have been provided for the control panels and station protective relays, these rooms are situated in the administration block. A laylight with roof lights provides normal lighting for the control room, and cold cathode lighting above the laylight is used during hours of darkness.

## *Opening Ceremony*

Lord Citrine was introduced by Mr A. R. Cooper, Controller of the North West, Merseyside and North Wales Division, who in his opening remarks made reference to the history of the station.

Lord Citrine said that the development of the station was part of the general plan for bringing more electrical power to the worker. Forty-three stations had been commissioned during the past 6½ years and it was planned to add a further 12 million h.p. during the next six years. Atomic power for electrical generation would not be available in under 15 to 20 years and therefore future stations are planned with alternative coal or oil firing.

PRINCIPAL CONTRACTORS

| | |
|---|---|
| Civil engineering and Civil Consultants | Mouchel and Partners |
| Crane | Clyde Crane and Engineering Co. |
| Circulating Water Pumps | Gwynnes Pumps Ltd. |
| Boiler Feed Pumps | The Harland Engineering Co., Ltd. |
| Ash and Dust Handling Plants | International Combustion Ltd. |
| Motors | Laurence Scott and Electromotors |
| Pumps | Gwynnes Pumps Ltd. |
| Boiler units, pulverised fuel equipment | International Combustion Ltd. |
| Motors | Laurence Scott and Electromotors |
| Boiler Valves and Mountings | Hopkinson Ltd. |
| Superheaters | The Superheater Co., Ltd. |
| Economisers | Senior Economisers Ltd. |
| Pipework | Aiton and Co., Ltd. |
| I.D. and F.D. fans | Davidson and Co., Ltd. |
| Fuel Fans | Keith Blackman Ltd. |
| Automatic Control Equipment | Bailey Meters and Controls Ltd. |
| Dust Extracting Plant | Sturtevant Engineering Co., Ltd. |
| Coal Handling Plant | International Combustion |
| Turbo-Alternator sets, | C. A. Parsons and Co., Ltd. |
| Condenser Tubes and Plates | I.C.I. Metals, Birmingham<br>Yorkshire Copper Co., Ltd. |
| Motors | Lancashire Dynamo and Crypto Ltd. |
| Low Pressure Valves | J. Blakeborough and Sons |
| CW and Feed Pumps | Siemund Pumps Ltd. |
| High Pressure pipework | John Thompson (Wolverhampton) Ltd. |
| Valves | Hopkinson Ltd. |
| Main Switchgear | Ferguson Pailin Ltd. |
| Generator and Station transformers | C. A. Parsons and Co., Ltd. |
| Auxiliary Switchgear | A. Reyrolle and Co., Ltd |
| | Brookhirst Switchgear |
| Auxiliary Transformers | English Electric Co., Ltd. |
| Cabling | Bonar Long and Co., Ltd. |
| | British Insulated Callenders Cables |
| Battery | Tudor Accumulator Co., Ltd. |
| Rectifiers | Hackbridge and Hewittic Ltd. |
| Fire fighting equipment | Mather and Platt Ltd. |
| Telephones | Standard Telephones and Cables Ltd. |

# POWER SUPPLY Statistics

## AUGUST

DESPITE August's reputation for slackness, the record of plant commissioned by the B.E.A. last month compares favourably with the monthly average so far this year, comprising one turbo-alternator of 30 MW capacity and two boilers aggregating 730 klb/hr evaporative capacity. The set increases the capacity of Walsall generating station (Midland Divison) where it joins four others of similar size commissioned since 1949, the last in 1950. Of British Thomson-Houston manufacture, it will operate from 180 klb/hr Babcock and Wilcox boilers, operating at 600 lb/sq in., 850° F at the turbine stop valve.

Of the boilers, the largest, a 550 klb/hr unit, is recorded at Ince generating station, North West Merseyside and North Wales Division, and is the first item of plant so far commissioned. It is of International Combustion manufacture, ultimately powering a 60 MW, G.E.C. turbo-alternator. The second boiler increases the capacity of East Yelland station (South Western) by a further 180 klb/hr. In common with its four predecessors, it is a John Thompson unit, supplying 30 MW Parsons sets, of which two are commissioned so far.

This increase of 30 MW in B.E.A. installed capacity thus brings the total for the Authority to 19,074 MW, whilst that of the North of Scotland H.-E. Board remains constant at 578 MW. The overall total of 19,652 MW is 8·7% higher than that of a year ago.

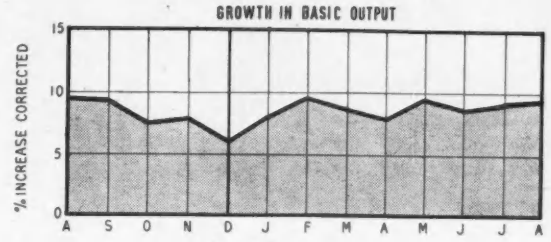
### *Energy Sales*

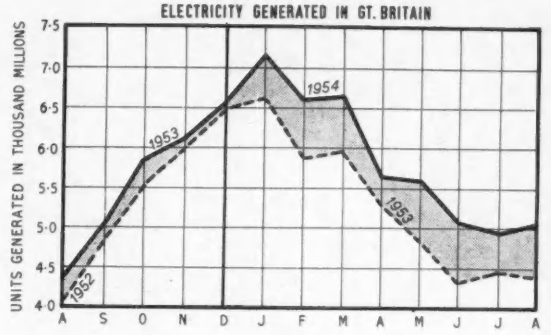
As last August also enjoyed the doubtful reputation of being one of the coldest on record, it is not surprising that sales of energy during the month were well up on those for August last year. In fact, no Area Board shows an increase less than 10%, figures ranging from 25·7% for the South Western Board (which continues to maintain its lead) to 10·9% for the South Eastern Board. The national increase of 14·6% is also impressive, although much of it is due to the lower average temperatures (57·8°F as against 61·6° F for August 1953). When corrections, however, are made for temperature and for the number of effective working days being somewhat higher this year, the increase in sales is seen to be some 9·3%. In Scotland also, the H.-E. Board continues to show an increase in the energy sent out, sales being 11·9% higher.

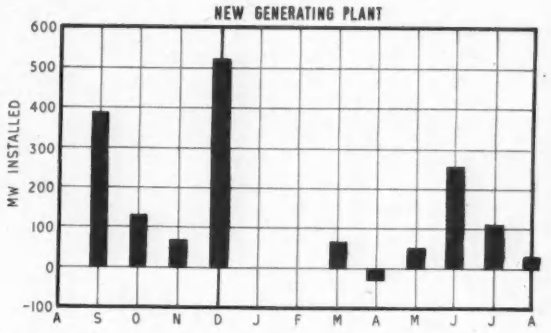
In absolute figures, units generated during the month amounted to some 5,028 millions, of which 4,931 millions were contributed by the B.E.A. and 96 millions by the North of Scotland Board. By classification into methods of generation, 4,916 million kWh were generated in steam stations, and 102 million kWh in hydro stations. Some 4,719m kWh were sent out, 94% of the total generated.

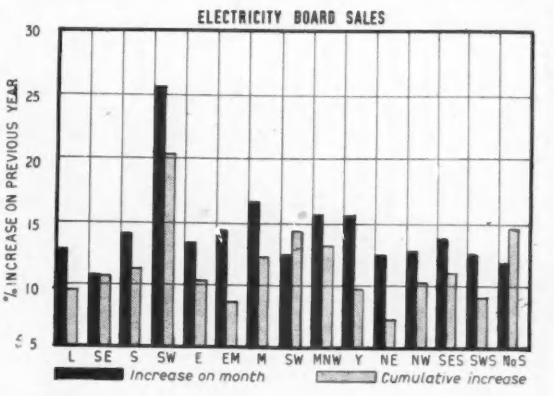
**B.E.A. Sales to Area Boards in August**

| Board | August sales in million units | % inc. or dec. on August 1953 |
|---|---|---|
| London ... ... ... ... | 376·6 | +12·9 |
| South Eastern ... ... ... | 238·8 | +10·9 |
| Southern ... ... ... ... | 291·1 | +14·1 |
| South Western ... ... ... | 160·8 | +25·7 |
| Eastern ... ... ... ... | 397·9 | +13·4 |
| East Midlands ... ... ... | 346·0 | +14·4 |
| Midlands ... ... ... ... | 441·9 | +16·7 |
| South Wales ... ... ... | 279·4 | +12·5 |
| Merseyside and North Wales ... | 279·8 | +15·7 |
| Yorkshire ... ... ... | 460·1 | +15·6 |
| North Eastern ... ... ... | 286·9 | +12·6 |
| North Western ... ... ... | 531·7 | +12·9 |
| South East Scotland ... ... | 103·5 | +13·9 |
| South West Scotland ... ... | 237·3 | +12·6 |
| Direct Sales by B.E.A. ... ... | 82·9 | +30·0 |
| Grand Total | 3,962·2 | +14·6 |



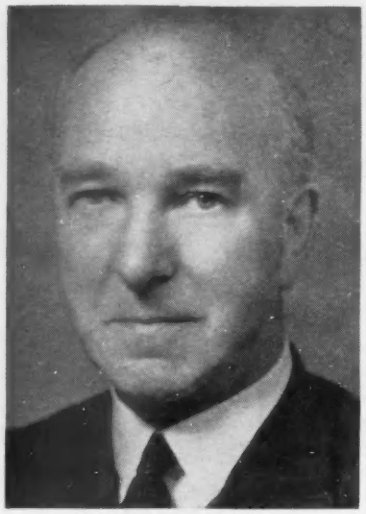



# New President and Chairmen of the I.E.E.

## 1954—1955 SESSION



Mr J. ECCLES
*The President*

IN view of the opening within the next few days of the new session of the Institution of Electrical Engineers, we have prepared, for the guidance of readers, the following brief notes to give a background of the president, and the chairmen of the sections and local centres.

The president, **Mr Josiah Eccles**, M.M., B.SC., M.I.E.E., M.INST.C.E., M.I.MECH.E., has held many prominent offices during his very long association with the Industry. He had the honour of being the last of a long list of distinguished presidents of the I.M.E.A. (in 1948), and was chairman of the E.D.A. Council in 1948-49. Mr Eccles was appointed deputy chairman (operation) of the B.E.A. early this year, after being chairman of the Merseyside and North Wales Electricity Board from 1948. Prior to that he was a member of the Organising Committee set up to make the necessary preparations for taking over the Supply Industry. An Ulsterman, Mr Eccles studied at Queen's University, Belfast, and later joined the Metropolitan-Vickers Electrical Co. specialising in the construction, erecting and commissioning of heavy electrical plant. He then went to the Edinburgh Corporation electricity undertaking in 1928 as senior technical assistant, and later held positions as generation engineer and deputy manager. Consequent on the breakdown in health of Mr Edwin Seddon, the then chief, Mr Eccles was appointed joint engineer and manager in April, 1939, and in August 1940, he assumed the sole responsibility of the undertaking. Three years later he became city electrical engineer at Liverpool.

Turning to the London sections, the Measurement Section have a wise choice in **Mr M. Whitehead,** A.M.C.T., M.I.E.E., as its chairman. The whole of his industrial experience has been gained with Ferranti Ltd, at Hollinwood, where he has been chief engineer of the Meter Department since 1940. He has served on many B.S.I., I.E.C., E.R.A., and B.E.A.M.A. Committees, including the chairmanship of the Meter Technical Committee. Immediately prior to the appointment of the Clow Committee he prepared a report on electricity tariff apparatus, at the request of the Minister of Fuel and Power, and subsequently advised on instrumental aspects of the peak load problem.

The Radio Section will have as its chairman **Mr C. W. Oatley,** M.A., M.SC., M.I.E.E., who joined the staff of the Engineering Department at Cambridge University in 1945 and was subsequently elected to a Fellowship at Trinity College. He early specialised in physics, being on the staff of King's College, University of London, from 1927 to 1939. During the war he worked on radar for the Ministry of Supply and in 1944-45 was in charge of the scientific work at R.R.D.E., Malvern.

The chairman of the Supply Section is that friendly character, **Mr J. D. Peattie,** B.SC., F.C.G.I., M.I.E.E., who became deputy chief engineer (generation) to the B.E.A. in 1948, following the death of Mr R. R. Martindale. Mr Peattie had joined the B.E.A. in the previous year as deputy chief engineer (transmission) after being deputy chief engineer to the C.E.B. for three years. A native of Dundee, he gained early experience with Siemens, of Berlin, and with Metropolitan-Vickers at Trafford Park, Edminston Brown and Co. at Glasgow, and the Manchester Corporation undertaking, before joining the C.E.B. in 1929 as operation engineer.

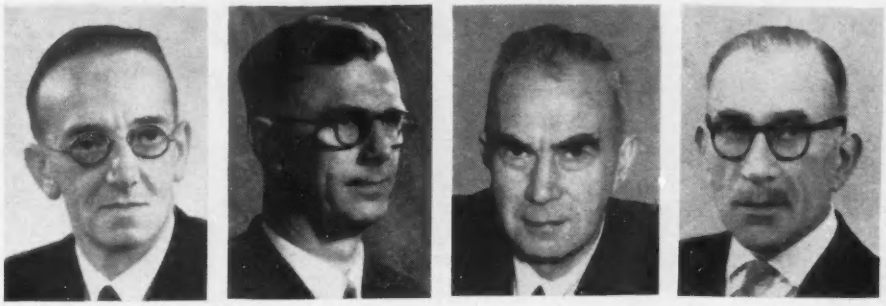
The choice of **Mr J. I. Bernard,** B.SC. (TECH.), M.I.E.E., M.I.H.V.E., as chairman of the Utilisation Section will be warmly applauded, for Mr Bernard, as chief technical officer of the Electrical Development Association has for many years been responsible for the technical side of E.D.A.'s advertising and publicity aimed at stimulating the consumption of electricity. He is also well known as a valuable member of numerous committees on heating and cooking and allied problems, installation and rural electrification matters. He is also joint secretary of the E.D.A./B.S.I. Advisory Committee on electrical appliances and accessories.

Turning to the chairmen of the local centres, in alphabetical order, **Major P. L. Barker,** M.I.E.E., who is chairman of the Northern Ireland Centre, is a Post Office engineer—he has been chief engineer for the Northern Ireland region since 1946. He entered the P.O. Engineering Dept. by open competition in 1924, and after ten years at the Dollis Hill Research Station, was at the Wembley Laboratories from 1936 to 1940. After war service he returned to the P.O. Engineering Dept. in 1945 and after a period in the Chester telephone area, transferred to Northern Ireland Region as chief engineer in 1946.

Chairman of the South Midland centre is **Mr A. R. Blandford,** M.I.E.E., who since 1949, has been chief electrical engineer to the English Electric Co. He started his career with the Walsall Electrical Co., of which he was assistant manager prior to joining the Electric Construction Co. in 1916 as assistant switchgear engineer. He joined the English Electric Co. in 1923 in a similar capacity, became assistant chief switch-

*Major P. L. Barker* *Mr A. R. Blandford* *Prof E. Bradshaw* *Mr W. A. Crocker* *Mr P. R. Dunn*

*The Section Chairmen, left to right, Messrs*
*M. Whitehead*
*C. W. Oatley*
*J. D. Peattie*
*J. I. Bernard*



gear draughtsman in 1927, chief switchgear engineer in 1928, and was promoted to chief engineer and manager, Switchgear Dept., in 1933. He represents the company on various technical committees.

Author of an I.E.E. paper on M.K.S. Units, **Prof E. Bradshaw,** M.B.E., PH.D., M.SC.(TECH.), M.I.E.E., head of the Electrical Engineering Department in the Faculty of Technology at Manchester University, is chairman of the North Western Centre. Founder and editor of the "Bulletin of Electrical Engineering Education," he is also organiser of several courses for Divisional and Area Board engineers at the B.E.A.'s Buxton training centre. He is particularly interested in the field of high voltage measurement.

The chairman of the North Midland centre is **Mr W. A. Crocker,** M.I.E.E. who, since 1948, has been manager of the York sub-area of the North Eastern Electricity Board. He started his career with the Bradford Corporation undertaking where he became assistant electrical construction engineer before going to West Ham in 1931 as technical assistant. There followed appointments as substations engineer at Plymouth, technical assistant to the Stretford and District E. Board, deputy borough electrical engineer at Birkenhead and, in 1946, city electrical engineer of York.

Deputy chief engineer of British Insulated Callender's Cables Ltd. since 1952, **Mr P. R. Dunn,** B.SC., M.I.E.E., is chairman of the Merseyside and North Wales Centre. He started with B.I. in 1925 serving for some years as a construction engineer. After a period of investigation and development work on h.v. cables and on factory processes, he became sales engineer to the company's Manchester area in 1932. Seven years later he was appointed assistant to the chief engineer of the then British Insulated Cables Ltd. After the formation of B.I.C.C. in 1945 he was engaged largely in technical liaison matters until 1952.

The chairman of the Scottish centre is another representative of the Cable Industry—**Mr John S. Hastie,** B.SC., M.I.E.E., M.AMER.I.E.E., director and technical manager of Scottish Cables Ltd. Prior to joining that concern in 1937 he was with Johnson and Phillips Ltd., as chief cable technician and, for a time, manager of the Condenser Department. Earlier he had spent five years with Enfield Cable Works Ltd. as chief technical assistant, being mainly concerned with research and development of h.v. cables.

In addition to being a part-time member of the South Western Electricity Board, and carrying on a consulting practice under his own name (dealing with both electrical and heating and mechanical work), **Mr A. N. Irens,** D.F.H., M.I.E.E., M.AMER.I.E.E., who is the Western Centre's new chairman, is also chief electrical engineer to the Bristol Aeroplane Co. That concern takes a large supply from the South Western Electricity Board, in addition to operating its own extensive diesel installation, details of which were given in our 22 July issue. Mr Irens, by the way, was chairman of the I.E.E. Utilisation Section in 1950-51.

With an extensive experience of electricity supply matters, both in this country and abroad, **Mr E. A. Logan,** M.SC., M.INST.C.E., M.I.E.E., M.I.MECH.E., F.R.ECON.S., will be a popular chairman of the Southern Centre. Since 1948 he has been manager of the Portsmouth subarea of the Southern Electricity Board. Prior to 1946 he was for 10 years engineer and manager of the Erith U.D.C. electricity undertaking. The years between he spent in Burma as engineer and manager to the government (when he was responsible for restoring the war-damaged electricity supply undertakings), and as secretary to the Hydro-Electric Survey Board of Burma. He also assisted in preparing the Bill to nationalise the electricity supply there. That work was terminated by the armed insurrection throughout Burma.

Chairman of the North Eastern Centre, **Mr G. W. B. Mitchell,** B.A.(CANTAB.), M.I.E.E., has also had overseas experience, first in France, and later with the State Electricity Commission of Victoria, Australia. Since 1929 he has been with Merz and McLellan, the consulting engineers. Initially he was concerned with the preparation of schemes and estimates for the S.E.E., M.E.E. and N.E.E. areas of the Central Electricity Board's system. Since then he has been associated with a wide variety of work which the firm has undertaken. He is especially interested in protection matters.

Primarily interested in the light current research field, **Dr J. H. Mitchell,** B.SC., PH.D., M.I.E.E., F.INST.P., the chairman of the East Midland Centre, has been head of research to Ericsson Telephones Ltd., Nottingham, since 1947. He started as a research student at Bristol University, and after a period as research engineer with the B.T.H. Co., Rugby, joined the Scientific Research Pool, A.M., M.A.P., and M.O.S., being engaged on research on radar (for which he gained an award), v.h.f. communication and radio aids to navigation. For a time he was with O.R.S. Coastal Command Aircraft Instrumentation.

*Mr J. S. Hastie* *Mr A. N. Irens* *Mr E. A. Logan* *Mr G. W. B. Mitchell* *Dr J. H. Mitchell*

# Progress in Standards

## B.S.I. YEARBOOK TELLS OF WIDESPREAD ACTIVITIES

WARTIME experience produced a sharp increase in the range of interests of the British Standards Institution and in its influence. The more obvious results of this greater activity are apparent in the standards it has published, but the work of the B.S.I. goes beyond this. There has been a need for some overall record of activities, and now this has been provided, with the issue for the first time since the war of a printed annual report. It covers the twelve months ended 31 March, 1954.

It is appropriate that such a report should appear reviewing a year when the Institution made the major change of a move to new premises, more in keeping with its activities and prestige than those previously available. The move has made practicable an increase in the technical staff of the Institution, in line with the recommendations of the Cunliffe Committee; the growth of work on certification marking has also required additional specialised staff. It must be a source of satisfaction to the membership to know that the office and administrative staff are reduced in numbers, in spite of this change.

An outstanding feature of the year under review was the completion of much work on basic engineering standards, such as those covering engineering drawing, practice (a revision) and limits and fits. Some of the good work brought to a conclusion originated in interchangeability problems in wartime, and all the standards concerned have been discussed to some extent with the A.B.C. (America, Britain, Canada) countries and by technical committees of the International Organisation for Standardisation, with a view to ensuring co-ordination wherever possible with similar developments in other countries.

### *Research and Certification*

Standardisation cannot be separated from research, which establishes desirable values and indicates possible difficulties. Yet the B.S.I. itself has no facilities to carry out such research. Experience has shown that this presents no insurmountable difficulties. The report emphasises that it is the considered policy of the Institution to rely on the research resources available in the various industries of the country. It is argued that this is better in its results than anything that could follow an attempt by B.S.I. to set up centralised facilities, which inevitably would fail to compare with existing specialised establishments in terms of technological knowledge and expertise. Industrial firms, D.S.I.R. and the research associations all give extensive help in this respect, and this is acknowledged in the report.

Existing B.S.I. certification mark schemes were reviewed by the Mark Committee during the year, and where necessary, arrangements were made for tightening up inspection and testing. Amongst the schemes reviewed were those for steel conduit and plastic powders and mouldings. The report explains that where standards are revised, steps are taken simultaneously to review the relevant mark schemes. An example here is provided by the scheme for tungsten filament lamps. Arrangements have been made so that when new schemes are under consideration, expert statistical advice can be obtained on quality control, frequency of testing, and related topics.

At the end of the year under review B.S.I. assumed new responsibilities in relation to Codes of Practice. A new Council has been elected, and there is an agreed plan of organisation envisaging four Codes of Practice committees, one of which will be electrical. These committees are now being set up, and their scope and functions defined.

There is a regular interchange of information on standardisation work between the countries of the Commonwealth, and there was an example of this in the Conference on Cables held in July 1953. This showed a new trend in such Commonwealth interchanges which may be of much significance for the future. One result of this conference is believed to have been that certain tendencies towards divergence of practice have been reversed, and conditions have been set out which should provide for greater alignment of methods in the future.

### *International Commissions*

B.S.I. activities outside the Commonwealth include representation of United Kingdom interests on a number of international organisations. Amongst them may be noted, the International Commission on Rules for the Approval of Electrical Equipment (C.E.E.). Though this body is concerned with electrical specifications from the point of view of testing and approval, the work of the C.E.E. overlaps at many points with that of the International Electrotechnical Commission. Discussions have taken place between the various bodies concerned to secure closer co-ordination of presentation of the British viewpoint. However, a proposal to combine the British National Committee for the I.E.C. and the joint E.D.A./B.S.I. committee concerned with C.E.E. matters was not found acceptable by all the Associations concerned.

Progress in a more restricted field has been made on the basis of a 1952 agreement with American Standards Association representatives, to endeavour to co-ordinate terms and definitions as used by that Association and B.S.I. Amongst the subjects in which "quite encouraging progress" is reported are electricity, acoustics, and nuclear physics. On the latter subject, a B.S.I. committee has been set up and has started work on preparing a British Standard Glossary for nuclear terms, using the American Standard as a basis.

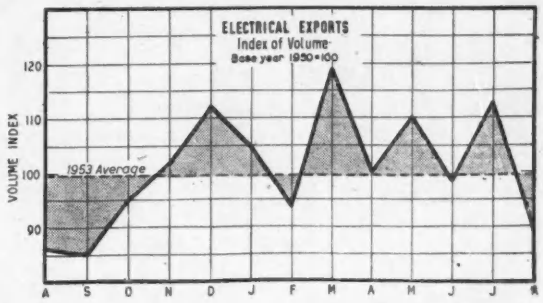
### *Electrical Standards*

The Annual Report comments at some length on the work of the various sections of B.S.I. It notes here that the four main standards for rotating electrical machinery covering industrial motors and generators and machines of the turbine-driven type are now under revision. They are to be combined in a single standard. All machines of 50 b.h.p. and above will in future be rated on a continuous maximum basis, instead of the load-plus-overload basis. Standards for turbo-alternator sets of preferred ratings are also in preparation, completion awaiting only the finalising of the section on steam turbines.

During the year reviewed, there was some progress in the preparation of a standard for plugs and sockets for industrial applications. This work has been proceeding for several years, and there are related international discussions in progress.

Discussions continued during the year on the standardisation of cyclometer meter dials. In particular, agreement has been reached between B.S.I. and the Ministry of Fuel and Power that meters with such dials will be approved, although they are not covered by BS 37. However, the Ministry is to adhere to the principle of approving only meters to BS 37, unless there is a specific request from B.S.I. to the contrary.

# EXPORTS and IMPORTS




## Statistics for August

AS might have been expected from a traditional holiday month, exports of electrical equipment dropped sharply during August, although somewhat above that for August last year. The fall is indicated by the ELECTRICAL TIMES Exports Volume Index which, from its July figure of 113, sank to 89, 10 points below last year's average of 99, based on 1950 as 100. Its new value, incidentally, is the lowest this year, previously 95·5 for June.

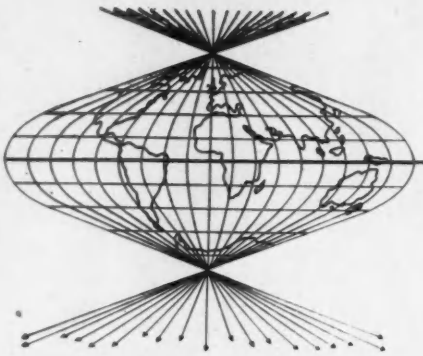
In value, electrical goods exported last month amounted to £12,440,554 as against last August's higher figure of £12,469,381, thus indicating the fall in prices which has taken place during the last twelve months. It should be borne in mind, however, that the term electrical goods covers machinery, apparatus and appliances which are quoted in the official accounts under Division 16 of Class D. Domestic refrigerators and washing machines are excluded from this classification, and when their exports value is added to that for the Division the total shown below in the table is obtained.

The decline in electrical exports last month affected nearly all types of apparatus, from the heavy engineering plant, to the domestic appliances. But it is noteworthy how exports of domestic apparatus last month compared with August of 1953. It will be seen that apart from washing machines, which suffered a sharp setback last month, the totals for the particular apparatus were higher than a year ago. Particularly was this so in respect of cooking and heating apparatus, and refrigerators.

Our best customer for the month was India, taking goods to a total value of over £1,390,000 with South Africa in second place (£1,180,000) and Australia third (£1,020,000).

| Description | Exports value (£) | | | Imports value (£) | |
|---|---|---|---|---|---|
| | Monthly Average 1952 | August 1953 | August 1954 | August 1953 | August 1954 |
| Generating Sets: | | | | | |
| Diesel up to 200 kW | 408,225 | 294,708 | 329,400 | | |
| „ over 200 kW | 214,949 | 220,063 | 344,239 | | |
| i.c. driven | 31,920 | 27,436 | 13,358 | | |
| Steam turbine-driven | 143,882 | 148,851 | 17,444 | 30,835 | 21,910 |
| with other prime movers | 31,520 | 71,157 | 59,587 | | |
| Generators | 210,823 | 273,078 | 140,726 | | |
| „ parts | 369,110 | 571,869 | 578,504 | | |
| Motors | 892,465 | 637,516 | 745,436 | 31,641 | 21,377 |
| Motor starters and controllers | 234,035 | 164,720 | 185,375 | | |
| Convertors and rectifiers | 103,602 | 76,342 | 34,608 | | |
| Transformers | 873,260 | 839,333 | 696,143 | 22,813 | 37,634 |
| Switchgear and Switchboards | 1,291,656 | 1,257,908 | 1,132,516 | | |
| Batteries, primary and parts | 212,536 | 205,064 | 304,887 | | |
| Fluorescent and Discharge lamps | 53,194 | 37,537 | 51,916 | | |
| Other lamps | 123,932 | 79,758 | 108,757 | | |
| Radio and Electronic gear | 1,916,241 | 1,707,808 | 1,978,924 | 398,876 | 552,558 |
| Telephone and Telegraph Plant | 1,372,016 | 1,272,643 | 1,035,065 | | |
| Cooking Appliances and parts | 114,943 | 100,906 | 170,197 | | |
| Space heaters | 26,489 | 22,037 | 24,315 | | |
| Water heaters | 32,963 | 16,070 | 22,130 | | |
| Other heaters and parts | 128,498 | 106,125 | 127,399 | | |
| Welding machinery | 86,132 | 92,573 | 113,654 | 16,942 | 10,806 |
| Signalling and Bell equipment | 53,722 | 73,039 | 77,976 | | |
| Commercial Instruments | 135,473 | 138,078 | 114,636 | 73,851 | 92,674 |
| House Service Meters | 147,816 | 70,042 | 128,651 | | |
| Electro-medical and X-ray apparatus | 118,910 | 65,870 | 110,240 | 26,700 | 43,175 |
| Fans | 110,447 | 109,335 | 110,651 | | |
| Vacuum Cleaners | 159,303 | 85,286 | 121,900 | | |
| Other Appliances and parts | 232,481 | 163,074 | 310,511 | | |
| Portable power tools | 112,423 | 105,214 | 150,819 | | |
| Washing Machines up to 150 lb | 443,379* | 143,357 | 126,424 | | |
| Power Refrigerators, up to 12 cu ft | 565,985 | 415,810 | 593,678 | | |
| Telephone and Telegraph Cables | 746,946 | 449,975 | 230,470 | | |
| Paper-insulated Cables | 883,068 | 639,363 | 281,922 | | |
| Rubber-insulated Cables | 622,124 | 291,571 | 365,595 | 3,838 | 4,266 |
| Winding and similar Wires | 151,677 | 118,776 | 108,130 | | |
| Other Cables and Wires | 276,939 | 217,733 | 217,033 | | |
| Accumulators and parts | 452,491 | 736,394 | 304,853 | | |
| Insulating Materials | 165,900 | 77,902 | 113,263 | | |
| Electrical Ware | 103,886 | 68,473 | 59,177 | | |
| All other articles | 1,595,762 | 1,261,542 | 1,420,146 | 196,026 | 350,771 |
| **Total** | 16,051,060 | 14,028,548 | 13,160,656 | 801,522 | 1,135,171 |

* Including models of up to 250 lb in weight



# OVERSEAS NEWS

*A SUMMARY OF IMPORTANT EVENTS*

## CANADA

### Further Expansion

Production of electricity by the Quebec Power Co. system in the first half of the current year showed a gain of 12·6% over the figure for corresponding period of last year, at 334·9 million kWh, according to Mr J. A. Fuller, the president. The construction and maintenance programme for the year is well under way and orders have been placed for practically all new equipment to be installed during the year. Included in the work is the installation of an additional 10,000 kVA transformer bank at the Limoilou substation in Quebec City and of a new submarine cable between the mainland and the Island of Orleans, to replace the present one which has reached the full power-carrying capacity.

### More B.C. Power?

Another prominent mining organisation is seeking development rights in British Columbia. This is the Waddington Mining Corporation which has asked the Provincial Government to approve its plan to develop as an initial step 500,000 h.p. in the Homathko-Tatlayoko drainage basin, and the erection of smelting plant.

The project, which involves damming the Homathko river at the end of Bute inlet, would cost $150 millions. As in the case of the recently-announced Frobisher Ltd. project in the northwestern corner of the province, Waddington proposes treatment of ores and concentrates at the smelter and the establishment of metal industries.

A series of dams and generating stations would be located from Tatlayoko lake to the mouth of the Homathko river. Preliminary surveys have been carried out, it is understood. The gateway to the site, Bute inlet, would probably be accessible by both water and rail.

### Next St. Lawrence Problem

Now that initial plans for the St. Lawrence Seaway and Power project have been agreed between Canada and America, interest is being centred on the question of whether Quebec wishes to include power plants in her section of the river. At the moment there are two plans, the first, estimated to cost about $400 millions of which Quebec Hydro would provide three-quarters, involving a power site at Victoria Bridge with an ultimate capacity of 1·2 million h.p. This would entail damming the river. The second plan, to cost $122½ millions, which the St. Lawrence Seaway Authority would provide, is to construct a 27 ft through waterway in a large arc around the south shore. Under this, there would be no power development in that stretch of the river, but Quebec could add the necessary dams for power production at a future date. From Quebec's point of view, it seems to be a case of "should she spend $300 millions on the power development now when there are still alternative sources of power ready for development." A site at Lachine has been considered but construction costs would be relatively high, it is estimated (about $265 per h.p.) whereas the Bersimis River and other projects could be developed for considerably less.

### Diesel for Edmundston

Installation of a 2,500 h.p. diesel engine generator designed to burn boiler fuel is announced from Edmundston, New Brunswick. The plant, which should be in operation by December, is claimed to be the first stationary diesel installation of its type in Canada.

## CARRIBEAN

### Development

In the Dominican Republic work is proceeding on the new generating station of the Compania Electrica de Santo Domingo which is being built alongside the old plant in Ciudad Trujillo. The new generator is reported to have a capacity of 12,000 kW, which will double the capacity of the present equipment, and it is hoped that it will be installed by the end of the year. The total cost of the new works, which are being supervised by Stone and Webster Engineering Corporation of Boston, U.S.A., is given as RD.$2,250,000.

## SWEDEN

### New Plant

The Swedish Water and Power Board has applied for official consent to the construction of a new power station at Jaerkvissle on the Indalsaelven river in North East Sweden. Cost of the project is estimated at 72 million crowns. The plant will have an installed capacity of 82,000 kW, and the annual output is estimated at 390 million units. Construction work will probably take about four years. There is also news from Sweden that the new Ligga power station, on the Lulea river, will be operating at full capacity shortly. Plant installed amounts to 140,000 kW and annual output is about 700 million units.

## S. AFRICA

### Atomic Study

The South African government has decided to send a 3-man technical commission to visit Britain next month to carry out an initial study into the progress made in the application of atomic power for industrial purposes, including electricity generation. The names of the three individuals have not yet been disclosed.

## MIDDLE EAST

### Steam Returns to Khartoum

With the installation of new steam power plant which is to be ready for service by the middle of 1956 the Sudan Light and Power Co.'s power station at Burri, Khartoum, reverts to steam prime movers after almost 30 years of diesel operation. The present station dates from about 1906. So steady and rapid has been the growth in demand for electrical power since 1945, that a programme for the installation of diesel units has had to continue concurrently with the planning of the new steam station. The last of the diesel units is due to be commissioned early in 1955, by which time the station capacity will have been virtually trebled since World War II. The last seven units, each of over 1,000 kW rating, are of the supercharged 16 cylinder V-type running at 750 r.p.m. It is intended that the more recently installed diesel units will continue in service for some years to come in a peak load and standby role, the steam plant being operated on base load. The initial steam installation will comprise two 5 MW steam turbo-alternator sets and oil-fired water-tube boiler units each of 68 klb/hr M.C. rating, the steam conditions being 450 p.s.i.g., and 750°F total temperature. Two features of the arrangement are of special interest. The very dry climate of Khartoum has made possible the adoption of an outdoor boiler

installation, with local enclosure only to the boiler operating platform. Condenser cooling will be by means of induced mechanical draught cooling towers designed for a re-cooled temperature with an approach within 5° of the wet bulb temperature.

## INDIA

### Madras Results

The urgent necessity of taking in hand such projects as the Periyar and Kundah hydro-electric schemes and for ordering the additional 30 MW steam generator for the Basin Bridge extension (for which tenders were invited in our 9 Sept. issue), is emphasised in the administration report of the Madras Government Electricity Department covering the year ended 31 Mar., 1953, just published. It is stated that even after the completion of the various schemes on hand (such as the Moyar and Pykara stage 3), the recurring problem of power shortage because of the persistent failure of the monsoon, will be a feature of the Madras State until expansion of thermal generation is undertaken. In this connection, the Neiveli thermal scheme based on the lignite deposits in the area assumes importance. There were 379,205 consumers at the end of the year served by all the electricity undertakings in the state, including government areas, an increase of 39,600. A total of 795·4 million units were generated during the year, compared with 800·21 millions in the previous period. The route mileage of government transmission and distribution lines increased by 1,390 miles. The total number of accidents during the period, including those on lines owned and operated by the government was 234 of which 112 were fatal. Incidentally, the report makes no reference to the formation of a State Electricity Board.

## AUSTRALIA

### A Matter of Signals

The Victoria Railway Commissioners, Australia, are shortly sending their signalling engineer, Mr G. Woolley, on a tour of Britain, Europe and America to study modern signal methods and underground railway signalling. He is to present a report to the Commissioners on the type of signal system which would be required for Melbourne's proposed underground railway. This underground project is estimated to cost about £15 millions, and construction work would take between three and five years. Under the scheme three stations would be built in an effort to relieve congestion at Flinders St, the main passenger station for the suburban electric rail service. Flinders St is already working at full capacity, and it is estimated that by 1960 about 300,000 people will be going into Melbourne every day by rail. The population of the city is expected to pass the 2,000,000 mark during the 1970's and the State Government regard the underground scheme as being an urgent one.

### Loan for Expansion

To finance plans for further development, the State Electric Commission of Western Australia, launched a £1½ millions loan last Friday. For this, the No. 5 loan, the interest rate is £4. 15s. per cent, and the term ten or twenty years at the option of subscribers.

### Victoria's Good News

Preliminary figures, still subject to audit, show that the State Electricity Commission of Victoria made a record surplus of £359,000 last year, Mr R. A. Hunt, chairman of the Commission, has announced. But there are no plans for any immediate reduction in tariffs, he warned. Giving his "best-year-yet" report, Mr Hunt said the Commission's revenue from all sources was £23,680,000 — an increase of £2,944,000 on the previous year. Total expenditure was £21,809,000. The Commission had continued its policy of using part of the year's surplus so that these charges should not become a permanent burden on fixed capital assets. Mr Hunt pointed out that the problem of obtaining sufficient capital moneys for the major tasks ahead was a very real one. The Commission would increasingly have to follow the practice of large private organisations which "ploughed back" into the business much of the surplus earned each year, he added.

## NEW ZEALAND

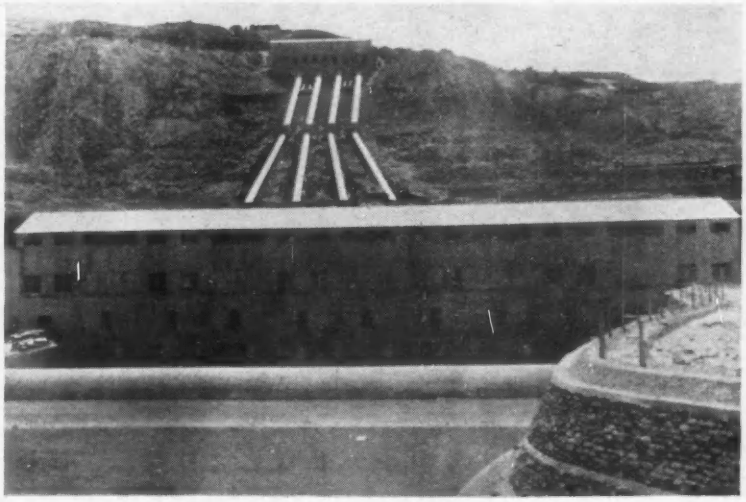
### A Good Report

The Hutt Valley Electric Power Board is another of the New Zealand undertakings which have developed enormously in recent years, particularly in regard to domestic electrification. In fact, Mr I. R. Robinson, B.E., M.I.E.E., the engineer and general manager, claims in his report for the year ended 31 Mar. last that although the Board's area covers 530 sq miles, there are only about 37 dwellings where power is not available. At the end of Mar. there were 30,044 consumers of whom 27,279 were domestic. Over 60% of the consumers have electric cookers, and more than 64% water heaters. The total number of units sold in the year amounted to 180·7 millions, compared with 154·3 millions in the previous year, and this despite an average increase of 35% in tariffs necessitated by a rise of 57% in the bulk supply charges of the State Hydro-Electric Dept. The average number of units sold per consumer during the period totalled 6,017, an increase of about 11%. In the circumstances, Mr Robinson can be well satisfied with a surplus of £21,500 for the year. It seems he will be more pleased when the Board can take over its new head office where better facilities will be provided for consumer service.

## THAILAND

### Trolleybuses for Thailand?

The possibility of introducing trolley buses in the Bangkok area has been suggested for some time. Now the Bangkok Electricity Works organisation has prepared what is called "a long term plan" to introduce such transport in certain districts of Bangkok and Thonburi. The authorities are considering the proposals, we understand.



*The partition scheme in 1947 left Pakistan seriously denuded of electric power generating facilities. Since that time strenuous efforts have been made to improve the position, and much of this work is now nearing fruition. One scheme which was recently inaugurated was the Dargai hydro-electric works, in North-West Frontier Province, the power station of which is shown alongside. This station, the second largest hydro-electric project in Pakistan, is situated about 5 miles downstream in the Upper Swat Canal from the earlier Malakand station, and has four 5,000 kW turbo-alternators. The tail race of the Malakand has been taken along a falling contour in the adjoining hillside, at the end of which is a drop of 250 ft to the station. Generating voltage is 11 kV and this is stepped up to 132 kV for transmission to various parts of N.W.F. Province and the Punjab*

# Personalities

## IN THE INDUSTRY

On 16 Oct. next **Mr L. C. Penwill,** C.B.E., COMP.I.E.E., director and secretary of the Electrical Contractors Association, and **Mr A. F. Plummer,** president of the Association, are sailing for the U.S.A. The main purpose of their visit is to attend the conference of the National Electrical Contractors Association of America, in New Orleans. They expect to be away about a month.

It was announced last Thursday that **Sir Robert Fraser** has been appointed director-general of the Independent Television Authority. He is now director-general of the Central Office of Information.

Among the awards made by the Council of the Junior Institution of Engineers in respect of papers and lectures delivered during 1953-54, the North West Section prize goes to **Mr F. E. Bancroft,** of Manchester, for his paper on "The Design and Construction of Special Electro-Mechanical Devices."

Engineer for steam stations to the State Electricity Commission of Victoria, Australia, for the past few years, **Mr T. P. Pringle,** B.E.E., B.M.E., A.M.I.E.E., has been appointed assistant engineer for generation to the Commission. Mr Pringle was power station superintendent at Yallourn from Mar. 1946 until May 1950.

Just appointed as assistant secretary (education and technical) at the head office of the Association of Supervising Electrical Engineers is **Mr W. E. Jones,** M.I.E.E., who has had extensive experience in the electrical industry. From 1931 to 1946 he was borough electrical engineer and manager of the Basingstoke Corporation Electricity Department, and between 1946 and 1948 was area officer (mains) to the London and Home Counties J.E.A. From 1952 until early this year he was engaged on administrative and technical work as a member of the technical staff of the British Electrical and Allied Research Association at Leatherhead, and his last appointment was that of secretary to the Diesel Engine Users' Association. Educated at Chaloners Foundation School and the Borough Polytechnic, Mr Jones served a pupilage under Mr F. Swarbrick the then engineer and manager of the Minehead Electric Supply Co., and subsequently gained further experience with the South London Electric Supply Corporation Ltd., Hong Kong Electricity Co., Wolverhampton Corporation undertaking, and the West Midlands J.E.A., before going to Basingstoke as chief assistant in 1929, and succeeding Mr F. Swarbrick as borough electrical engineer and manager there in 1931.

**Mr R. McL. Fairfield,** B.SC.(ENG.), M.I.E.E., M.I.MECH.E., M.AMER.I.E.E., has been appointed director and general manager of British Insulated Callender's (Submarine Cables) Ltd., the new company which has recently been formed by British Insulated Callender's Cables Ltd., and W. T. Glover and Co., Ltd., to specialise in the manufacture of submarine power cables. Mr Fairfield was a director member of the projects engineering panel of the B.I.C.C. Group who carried out on behalf of the B.E.A. the development of the 132 kV gas filled cable, and subsequent sea trials, in connection with the proposed Cross Channel cable link. Mr. Fairfield is director and general manager of W. T. Glover and Co., Ltd., and a director of the St. Helen's Cable and Rubber Co., Ltd., Veedip Ltd., (chairman), and Rotunda Ltd.

Chilton Electrical Products Ltd. have appointed **Mr E. Theobald,** M.I.S.M.A., as their new sales executive for dry shavers and shaver accessories for the London area. He will operate from the firm's London office and showroom at 19 Old Queen St, S.W.1. Mr Theobald spent some years in the commercial sales department of Hoover Ltd., and afterwards he was sales manager of Lectron Hearing Aid Co., until April 1953. Since then he toured New Zealand, introducing a number of agencies for British manufacturers.

In recognition of his 25 years' service with the Mullard organisation, **Mr L. A. Sawtell,** has been presented with a gold watch and a cheque by Mr S. S. Eriks, managing director of Mullard Ltd., on behalf of the directors. Mr Sawtell has been commercial manager of the firm's Entertainment Valve Dept. since 1945.

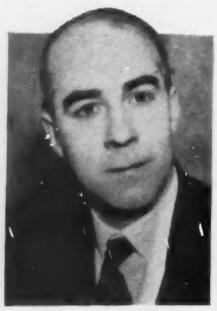
Formerly assistant general manager at the Willesden works of Lancashire Dynamo and Crypto Ltd., **Mr C. F. Jackson** has been promoted to general manager at those works. Mr Jackson, who received his technical education at Paddington Technical College, joined L.D.C. in 1941 having previously been works manager of Crypton Equipment Ltd., an associated company. During the last war he conducted a series of lectures for business executives in production planning and industrial administration at well-known technical colleges.

**Mr C. H. Foulkes,** M.I.E.E., has recently been appointed by Standard Telephones and Cables Ltd as head of the Company's valve division and location manager at Dowlish Ford Mills, Ilminster, Somerset. This division is responsible for the development and manufacture of all of the Company's special valves but does not include broadcast receiver valves. Mr Foulkes joined the company in April 1936 as a laboratory assistant, assembling cathode ray tubes. In 1940 he was moved with the S.T.C. valve division to Ilminster, and throughout the war was engaged in the development of micro-wave tubes, and served on several government committees for the co-ordination of valve development for the armed services. He

*Mr W. E. Jones*

*Mr R. McL. Fairfield*

*Mr E. Theobald*



*Mr C. F. Jackson*

*Mr C. H. Foulkes*

continued to serve on those committees after 1945, but this work moved away from micro-wave tubes to cold cathode gas-filled tubes, repeater tubes, including underwater cable repeater tubes, and high power transmitting tubes. In 18 years of service with S.T.C. he has, in fact, at one time or another, worked upon almost every type of electronic vacuum tube. Early in 1954, he went to the U.S.A. to study for three months on the Advanced Management Programme at the Business School at Harvard University. After completing the course in May, he spent several weeks visiting electronic valve companies in the U.S.A. before returning to England to take up his present appointment.

**Sir Harold Roxbee Cox**, B.SC., PH.D., D.I.C., M.I.MECH.E., F.R.AE.S., F.INST.F., has been elected a director of the Brush Group Ltd. Until recently, Sir Harold was chief scientist to the Ministry of Fuel and Power, from which position he resigned on 30 June.

**Mr J. B. Charters** has succeeded **Mr Marsden Ryle,** who recently retired, as manager of the Osram Glass Works at Wembley and Leamington, of the General Electric Co., Ltd. Mr Charters began his career with the General Electric Co., Ltd., at the Osram Lamp Works, Hammersmith, and was assistant factory superintendent there when he joined Wembley Glass Works in November 1943 as factory superintendent. Later, in January 1947, he was appointed production manager. The post of production manager left vacant by Mr Charters has been filled by **Dr F. S. Hawkins,** who, before joining the staff of Wembley Glass Works in February this year, was in charge of the Glass Department at the Research Laboratories of the company.

**Mr Harry Smith** has been appointed deputy chairman of British Ropes Ltd. He retains his position as a joint managing director. **Mr John R. Dawson** has been appointed a joint managing director of the company. He is general manager of the British Ropes' Sunderland factory and joined the main Board of the company in 1953. Mr Dawson will deal mainly with the fibre side of the company's affairs.

The appointment is announced of **Mr G. G. Buckingham,** M.INST.F., as manager of the Manchester office of Babcock and Wilcox Ltd., in succession to the late Mr F. W. Woodfield, whose death we reported recently. Mr Buckingham was educated at St. Albans School, and joined the Spearing Boiler Co. in 1921 as a draughtsman. He left to join the Buell Combustion Co. in 1926 and, in 1929, joined the Stirling Boiler Co., Ltd., in their drawing office, later transferring to the sales department and becoming chief assistant to Mr S. J. Whybrow, the general manager. He was appointed to the Manchester office of Babcock and Wilcox Ltd. in February of last year, following upon the absorption of the Stirling Boiler Co., Ltd.

**Mr J. P. Ford,** managing director of Brush Export Ltd., and chairman of the Institute of Export, left by air on 22 Sept. for a 13 weeks' tour of Latin America.

The Minister of Fuel and Power has re-constituted and strengthened his Fuel Efficiency Advisory Committee by the appointment of the following three additional members: **Dr G. E. Foxwell,** D.SC., F.INST.P., F.INST.F., M.INST.GAS.E., M.I.CHEM.E., **Mr B. E. A. Vigers,** M.A. (CANTAB.), A.M.I.C.E., M.I.CHEM.E., M.INST.F., and **Dr W. A. Macfarlane,** B.A., B.SC., PH.D. The terms of reference of the re-constituted Committee will be: "To advise the Minister of Fuel and Power on particular questions in the field of fuel efficiency which he may remit to them."

**Mr W. R. Yates** has retired from the post of personnel manager to Partridge, Wilson and Co., Ltd. He has been with that company since it started in 1926.

**Mr R. G. W. Chapman,** B.C.E., A.M.I.E. (Aust.), has been appointed design engineer, Civil Branch, Design and Construction Department of the State Electricity Commission of Victoria, Australia. He has served for some years at the Commission's Kiewa project.

**Prof S. J. Davies,** D.SC., PH.D., M.I.MECH.E., has accepted the invitation to be president of the Junior Institution of Engineers for 1954-55. Prof Davies has been Professor of Mechanical Engineering at University of London, King's College, since 1937.

## OBITUARY

**Mr H. W. Hoover,** who developed the American vacuum cleaner business of that name, died in Ohio on 16 Sept., aged 76. He was the first Hoover sales representative for the business, which was founded by his father in 1907. He became general manager of the company in 1908 and the policies he formulated in those early days have been followed through all the subsequent years. He was president of the company from 1922 until 1948, when he became chairman of the board of directors. He had paid many visits to this country and was last here in 1948. He established the British organisation in 1919.

**Mr W. H. Goodman,** chairman of the Dubilier Condenser Co. (1925) Ltd., died on 15 Sept. aged 70. The original Dubilier Condenser Co. was formed in 1912 by Mr Goodman who was managing director until 1939. He continued as a director and consultant and was appointed chairman in April 1945.

# BRITISH STANDARDS

**The Performance of Octave Band-Pass Filters.** *B.S.2475:1954. Price 2s.* A set of band-pass filters intended primarily for the analysis of noise into a series of consecutive frequency bands each one octave wide is specified in the standard. The standard gives special attention to ensuring uniformity in the choice of frequency ranges, consistency between results obtained with different filter sets, and to determining that the bandwidth shall be as stated within understood tolerances.

**Cable Covers, Concrete and Earthenware.** *B.S.2484:1954. Price 2s.6d.* Prepared at the request of the British Electricity Authority, this standard gives a choice of three types of cover for indicating the presence of electric power cables and for protecting them against blows from excavating tools. One type of cover is made from burnt clay (earthenware) and the other two from concrete, one being reinforced. All three types are interlocking. "Electricity" and "Danger" have been agreed as the words to be moulded on all covers. Tests are laid down for the strength of the covers, and suitable test apparatus is described in appendices to the standard.

**Automatic Change-over Contactors for Emergency Lighting Systems.** *B.S.764: 1954. Price 4s.* Improvements in design since the previous edition in 1937 are recognised in this publication. In addition to specifying a range of standard current ratings, it covers the performance and certain constructional details of double-pole change-over contactors. A 15 amp 30 V size has been introduced to meet the need for smaller contactors. Because the current Cinematograph Regulations require that contactors of this type should comply with B.S. 764, and since a new edition of these Regulations is expected shortly, it has been decided that the new standard will not be fully applicable until six months after such revised Regulations are issued. The use of the registered certification mark of the B.S.I. as evidence of compliance with the specification is required.

**Methods for the Determination of Magnetic Permeability of Iron and Steel Bars, Forgings and Castings.** *B.S. 2454: 1954. Price 2s. 6d.* Both bar and ring specimens are provided for in this standard, which lays down test methods in considerable detail, under the headings, measurement of dimensions, windings, connection of apparatus, calibration and measurement. There is much experimental advice in the standard.

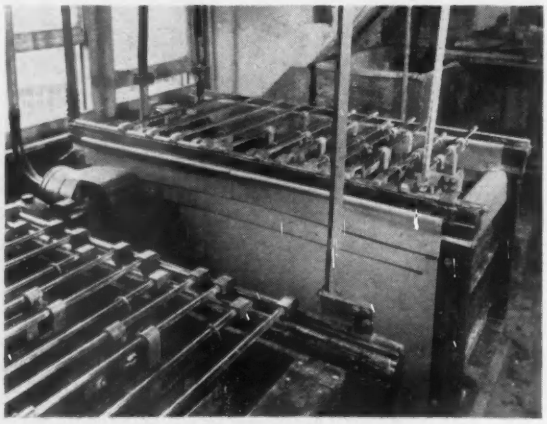
**The Normal Threshold of Hearing for Pure Tones by Earphone Listening.** *B.S. 2497:1954. Price 2s. 6d.* Values of sound pressure corresponding to the normal threshold of hearing of human subjects listening to pure tones of various frequencies by an earphone applied to one ear are specified in this standard. The aim is the future standardisation of hearing loss measurements.

# *Equipment for Industry*

## Versatile p.v.c. Sheeting

TO electrical engineers p.v.c. is widely known in the form of insulation for wires, in which case the basic substance is used with plasticisers to give the plastic almost rubber-like covering. The particular properties of this substance, resistance to chemical attack, low thermal conductivity and excellent ageing and electrical properties are widely known. BAKELITE LTD., 18 Grosvenor Gardens, S.W.1, are producing a rigid sheet made of p.v.c. which retains all the characteristics outlined above and may be used unsupported in temperatures up to 60° C. "Vybac" industrial rigid p.v.c. sheet VR.215 is the name given to the product and interesting use has been made of this material in the application illustrated below. Here it is used to line an electroplating tank which normally contains corrosive chemicals. Both welding and heat forming of the material has been used, in this instance, to ensure that no leakage and consequent corrosion of the main tank occurs.

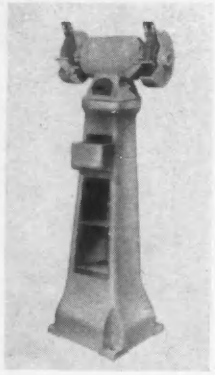
Other uses to which this material has been put are the "Turbro" range of fans made by Messrs Turner and Brown Ltd of Bolton, and for a processing tank for lithographic negatives. With its light weight, easy handling and hard wearing qualities, the material is a useful addition to the range of insulating materials available. Its versatility is such that it may be welded or sawn, and when heated may be moulded to any shape when cooled over a former.



*P.V.C. sheet is used here for prevention of corrosion on tank sides*

## Industrial Grinders

SUITABLE for use in machine shops, toolroom, workshop or the garage, the grinders made by BROOK MOTORS LTD, Huddersfield, are designed for maintenance of twist drills or for general light grinding duty. The basic casting contains the totally-enclosed single or three phase motor with permanent capacitor fitted in the base, for single phase, and the two grinding wheels with protectors. Adjustable tool rests and spark arresters are fitted. The unit is made with either 6 in. or 7 in. diameter wheels in which case 0·33 h.p. single-phase, 0·5 h.p. three phase and 0·5 h.p. single phase, 0·75 three phase motors are fitted respectively. Either size may be supplied for bench-mounting or with a cast-iron pedestal which is complete with built-in water cavity and two shelves as illustrated.



*Pedestal type grinder with water trough and shelves*

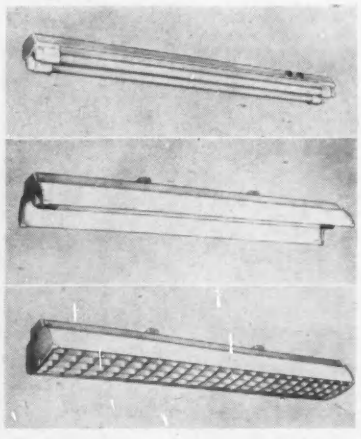
In addition to grinding, by fitting other attachments, available with the machines, they may be used for buffing, polishing and wire scratch-brushing. Dust-proof bearings are used throughout the range, thus ensuring reliable service. Middle Brunswick green is offered as standard but other colours are available.

## "New Range" Lighting Fittings

THE latest product of CROMPTON PARKINSON LTD, Crompton Hse, Aldwych, W.C.2, is a complete new range of industrial lighting fittings, which, although using but a few basic components, may be built up to form 54 varieties of fitting. Two units, a one-lamp and a two-lamp fitting, form the basis of the range which is designed to suit all locations and lighting applications. Available with either "Permawhite" high-gloss stoved enamel or vitreous enamel finishes, the latter is for use in gritty atmospheres. The whole range is known as "New Range" lighting fittings.

Die-cast end frames, either open or closed are fixed onto the basic fitting with one screw, after this all other components are merely clipped into position; the operation requires no tools. Side reflectors of either steel or opal-diffusing "Perspex" are available with open or closed-top effects. A feature of the open top reflectors is that, although a degree of upward light is obtained, there are no obvious apertures to cause a glare and there are no projections and thus, cleaning is simple. With only one side reflector in position the unit is suitable for illuminating wall charts or display shelves.

All closed-end fittings may be converted to louvre fittings simply by attaching the metal louvre which has a 25/35° cut-off. The open-ended fittings are intended to be used in applications where it is certain that there will be no need for louvres. Lamp replacement is simple, a cap, which, when in its normal position covers the end of the tube, is slid back so exposing the lampholder. The tube is then pushed towards the opposite holder and then withdrawn. This operation is possible from either end since spring-loaded earthed cap contact lampholders and sliding end caps are fitted. Features of the lamps are, the built-in quick-fixing device for close ceiling mounting, infinitely variable centres for fixing to ceiling or pendant mounting, and facilities for earth and earth continuity. Provision is made to attach fittings to conduit, conduit box, chain or any other form of suspension. All fittings comply with B.S. 2467. Prior to the application of the stove enamel all parts are "Bonderized," ensuring rustfree surfaces.



*The basic fitting with two lamps is shown (top) with one reflector and open end cap (middle) and louvre closed end (bottom)*

### Hunting Scenes for Autoperc

THE Autoperc coffee-maker can now be supplied with hand-painted sporting scenes, say the makers, ELGA PRODUCTS LTD., Elga Works Railway Place, Wimbledon, S.W.19.

At present, hunting, shooting and fishing motifs are available all hand-painted by the artist Dulcie Vaughan. The price is £8. 0s. 0d. and the manufacturers say that the reception accorded to this unusual introduction has been excellent.

### Remploy Tubular Heating Elements

SPECIALLY constructed for heating oil, water and chemical solutions the range of immersion heaters being produced by REMPLOY LTD., 25 Buckingham Gate, S.W.1, are also suitable for operation in free air. The tubular elements have a central nickel-chromium element which is surrounded by magnesium-oxide powder. After loading with powder, the sheaths are reduced in diameter, thus solidifying the powder and sealing the element into place. This process is claimed to ensure long life to the element and to guarantee efficient transfer of heat from coil to sheath. Since the units are tailor-made to suit the customer's specification correct design and accurate application should lead to economy of operation. Heating values obtained from the units vary from 25 to 50 watts per sq in., according to the application. Different forms of fixing are available to suit the particular job, screw types with either flexible lead-in, conduit or plain terminal fixing are made. Another type has flange fixing and a third, made in the form of a rod, has terminals at the ends. These units are particularly suitable for use in domestic heating apparatus and should find favour in this field.

## TRADE PUBLICATIONS

LAMPSHADES.—List No. 58 new season's list 1954/55 is available from Knightshades Ltd., Montague Rd, Edmonton. It features a new range of attractive contemporary models.

FLUORESCENT LIGHTING.—Smart and Brown (Engineers) Ltd., 8 Rose and Crown Yard, have produced an attractive leaflet featuring their fittings and describing their service. It is designed for issue by the English and Scottish Building Centres.

TELECOMMUNICATIONS.—A leaflet No. 1297 issued by Communications Systems Ltd., Strowger Hse, Arundel St. W.C.2, describes the ATM call and reply service for two-way conversation.

FIRE CEMENTS.—New leaflet "Sankey's Fire Cements" issued by J. H. Sankey and Son Ltd., Refractories Works, Ilford, Essex, gives particulars of Pyruma, Aluma fire cements and Siluma hot patching cement.

CAPACITORS.—New leaflets CL 542 R and CL 548 issued by A. H. Hunt (Capacitors) Ltd., Wandsworth, S.W.18, feature capacitors for power factor improvement and foil and paper capacitors for capacitor motors, etc.

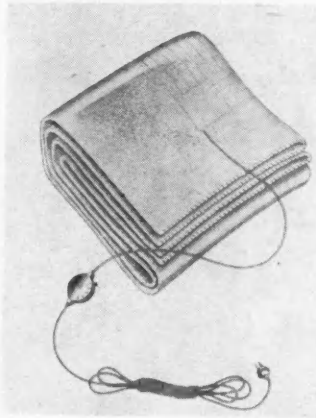
### New Season's Grubb Products

NEW products marketed by GRUBB ENGINEERING CO., LTD., Mary St, Birmingham 12, for this year's heating season include a range of tubular heaters a multi-purpose garage heater and a new convector heater.

The range of tubular heaters extends from 2 ft to 16 ft models in one, two, three or four tiers and prices range from 18s. 8d. plus 6s. 10d. tax for a 2 ft single tier heater to £16. 19s. plus £6. 4s. purchase tax for a 16 ft 4 tier heater. Rating is 60 W per foot and list price includes fixing brackets. Finished in burnished bronze and with ¼ in. conduit entry the heaters can be supplied in any combination of sizes up to 6 tiers. Room thermostats can be supplied at £2. 18s. 10d. (tax free).

The Garage heater is a 360 W double-tier tubular heater mounted on castor wheels. It is intended for sliding underneath a car where the even distribution of heat will help eliminate frozen radiators and pumps, eliminate condensation on electrical circuits and plugs and consequently save the car batteries when starting from cold. It is three foot long and costs £3. 11s. plus tax £1. 5s. 10d. and is for normal mains supplies.

The convectors in simple yet attractive style are finished in hammered gold lustre and rated at 2 kW. They are available mounted on castors or sturdy rubber feet. Fitted with switches for giving either 1 or 2 kW controlled heating the heaters measure 25 in. by 18 in. by 3 in. and weigh 18 lb. Price for the standard model is £6. 5s. plus £2. 5s. 8d. tax; castor model costs £6. 7s. plus £2. 7s. 6d. tax.



### Larger "Lana" Isoblanket

A LARGER size "Lana" Isoblanket (shown above) is now available, say ISOPAD LTD., 30-32 Rosemont Rd, N.W.3.

The new blanket is 80 in. by 70 in. overall with a heated surface of 50 in by 60 in. It is fitted with a 3-position switch giving a choice of full or gentle heat over the whole surface or one half on full heat only.

This larger model is similar to the smaller model 80 in. by 60 in. with heated surface of 54 in. by 30 in. which, large enough to tuck in around a single bed, could be used for double beds by laying it across the bed.

Made in rose, blue and green, these blankets are good quality wool blankets which tuck in around the edges and can be left in the bed all the time, giving additional warmth without weight when required. Prices are £10. 9s. (small) and £18. 15s. (large) respectively, incl. tax.

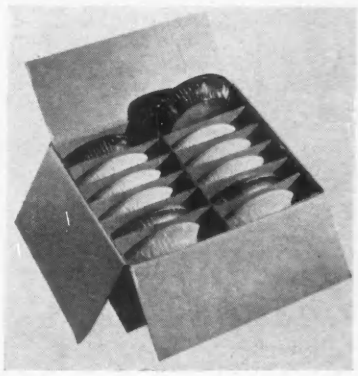
## *For the Electrical Trade*

### New Presentation for REAL Plinth Lights

ALL Plinth lights created by ROWLANDS ELECTRICAL ACCESSORIES LTD., "Real" Works, Birmingham, 18, are now despatched in a new moisture-proof and dust-proof cellophane wrap, which makes an attractive presentation pack.

A new standard rail certified pack has been designed, each container holding 12 appliances of a similar size. Thus the trader can see at a glance the number and colour of Plinths remaining in an open container. All cases carry a contents chart. A standard pack will contain 6 Pastel Cream, 2 Eggshell Black, 2 Gilt Lustre, 1 Pastel Rose and 1 Pastel Blue Plinth lights and all orders from the trade for a dozen of one size or multiples of the dozen will be sent carriage paid, space and packaging free.

*A standard Pack containing one dozen REAL Plinth Lights*



# PROBLEMS AND PRACTICE

## In Engineering

*Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.*

### Corrosion Troubles

A WAREHOUSE, which had been unused for some considerable time, was required to be converted into a workshop. There were many 15 amp aluminium alloy switched socket - outlets already wired, but before making them "alive," and ready for use, my attention centred on one outlet which appeared to be "growing" away from the wall.

Further examination showed that the lime from the brick work had attacked the aluminium alloy causing it to flake and swell, to within a fraction of an inch from the live pole. The remaining, and lesser affected, plugs were duly mounted on 6 in. by 3 in. switch blocks, to prevent a similar occurrence. It is worth noting that this deterioration had taken place in less than three years.—*R. T. C.*

### Dangerous Earthing

THE contribution by Mr J. H. Robinson to your 19 Aug. issue is a good example of "dangerous conditions" appearing through inadequate earthing or bonding of an installation, an occurrence that is more frequent than one would imagine, and which is usually associated in some way with lead-covered cables. Four cases which I have had to deal with, and which may have had serious consequences, especially come to my mind.

In my first case, children were found taking turns at touching a bare wire which ran down the outside wall of a house, laughing happily at the "tingling" it produced. Needless to say this wire was the installation "earth"—7/·029 bare copper, a coil of about 3 ft of it being buried some 6 in. below the surface of the ground. Amateur alterations to a 3 pin socket outlet inside the house had brought the phase conductor into contact with the so-called earth wire.

The second experience occurred when investigating a complaint that a house wall was "alive." I found that this indeed was so, it being possible to obtain quite severe shocks from the brickwork and mortar of the wall outside a terraced house. The cause was finally traced inside the house next door, where, due to damaged insulation, the live conductor of a twin lead-covered cable was in contact with the sheath, which had been stripped back for several inches to allow the phase and neutral wires to be inserted into a kWh meter. The cable, which fed an upstairs flat, was buried in plaster for most of its run, and the unbonded sheath being at phase potential resulted in the unpleasant outdoor leakage.

For the third instance, I go to a consumer who was perturbed that his meter was operating although all his apparatus had been switched off. Upon touching the main ironclad switch I received a severe shock, and subsequently found that the whole of his lead-covered installation was alive due to a phase-sheath fault. The bonding throughout was reasonably good, but the earthing device consisted of a single 2 ft, ½ in. diameter iron tube inserted in the ground just outside the back door, the earth resistance being about 30 ohms. Besides the risk due to electric shock there seemed to me considerable danger of fire, the property in question being a thatched cottage.

Finally, whilst inspecting a rural substation feeding a small overhead network, I noticed a considerable reading on an earth leakage ammeter (permanently fixed in the earth lead of the solidly-earthed transformer neutral).

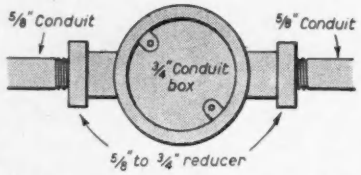
This leakage was seemingly traced to a large property fed by about 150 yds of four-core p.i.l.c.s.t.a. cable laid underground from a pole box solidly connected to the wood pole overhead distributor. No evidence of leakage was found in the house, but the incoming ironclad cut-out and the cable sheath proved to be at full voltage to earth. A pole box fault, one core to earth, had developed, the earth resistance of the cable sheath (plus earth rods at both ends) being too high to cause the substation fuses to blow. This fault could have been dangerous to life both inside and outside the house, and the incident illustrates the need for care when short lengths of cable are connected in and to overhead lines, especially when the connector is solid or the pole box is heavily fused.

Referring back to Mr Robinson's letter, it would be interesting to know the resistance between the water system and the supply neutral before the earth plate was added, as it seems surprising that one earth plate should have much effect upon the earth resistance value of a fairly extensive water pipe layout. Is it possible that a water meter or insulated joint intervened between the point of connection and the water system proper?

I have found that when "earthing" to pipes forming part of a farmhouse water system, it is very necessary to ensure that the water pipes themselves are electrically continuous, and that fortuitous conditions do not exist.—*W. D. Wood.*

### Running Joints

WHILST re-wiring a rather old screwed conduit installation recently, I found a rather interesting method of eliminating running joints. Where the conduits were made on to the conduit boxes and a running joint, in consequence, would normally be required, a conduit box, a size larger than the conduit, was used, the conduit being cut to the edge of the conduit box spout and threaded just long enough to take a reducer. The conduit was then placed against the conduit box spout and the reducer screwed home. This method certainly saves the laborious cutting of long threads and makes quite a sound job, eliminating the use of a separate nipple. One improvement I would suggest, though, is the use of a lock nut behind the reducer, although I must admit that this installation had not used lock nuts and had an extremely good continuity test.—*W. Satchwill.*




*Showing the use of a conduit box to eliminate running joints*

### Motor Ventilation

NORMALLY a screen protected type motor will clear itself of a reasonable amount of dust and dirt but it must be realised that there must be no undue interference with the cooling system otherwise overheating will result. Fluff, especially the long fibre variety, is particularly dangerous and there are all too many cases of motors burning out due to impeded ventilation, caused by the fluff accumulating, and choking up the ventilating system.

A recent case illustrated this fault quite clearly and to overcome the trouble the user had fitted fine mesh grids over the motor openings. The result was that the motor still overheated and it was quite clear that the grids which had been fitted were acting as efficient filters and while they stopped the ingress of fluff to the motor they themselves were choked up and thus impeded the flow of cooling air through the motor. In cases like this it is, of course, necessary to install a more suitable type of motor as for example a totally enclosed fan cooled type or a pipe ventilated machine, ensuring in the latter case that the cooling air is drawn from a clean dry source.—*"Torque."*

# NEWS OF THE WEEK

## British Trade Fair for Copenhagen in 1955

***120,000 sq ft of stand space for over 1,000 exhibitors***

ANOTHER all-British Trade Fair is to be held overseas. British Pavilions have been prominent at a number of exhibitions in various countries throughout the world for many years, and with the formation of British Overseas Fairs Ltd., a Trade Fair is shortly opening at Baghdad. Now a second Fair, organised jointly by the British Import Union of Denmark and the F.B.I. will be held, as previously announced in these columns, at Copenhagen between 29 Sept. and 16 Oct. next year. The object will of course be to stimulate British exports to Denmark and to the other Scandinavian countries. Similar exhibitions were held in Copenhagen in 1932 and 1948 and on the last occasion there were over 1,000 exhibitors and over a million visitors. This time the F.B.I. and B.I.U. will have the assistance of British Overseas Fairs Ltd. who will undoubtedly have gained much valuable experience from next month's efforts in the Middle East.

The exhibition itself will be held in the Forum building and the city's famous Tivoli. The former will house engineering exhibits; and the lighter industries, including consumer goods, will be accommodated in the Tivoli. These will be supplemented by prefabricated temporary structures to provide a total of not less than 120,000 sq ft of stand space. All exhibits will eventually be segregated into trade sections. Charges, with a few exceptions, will vary from about 8s. to 19s. 6d. per sq ft. Preliminary enquiries have already brought an enthusiastic response. Some 11,000 firms have been circularised to date and asked if they are interested and if possible the approximate amount of space they would require.

### Supply Section at Cambridge

WHATEVER the weather may have been throughout the summer, it was certainly on best behaviour for the I.E.E. Supply Section's visit to Cambridge last week, and even the doubtful gamble of a river trip on Sunday was blessed with an Indian summer. In the contemplative atmosphere of a university city it was to be expected that the programme would be less strenuous than usual but it included visits to factories of the Pye group, the University Engineering Laboratory and others of a less technical nature. Members enjoyed the hospitality of the Eastern Electricity Board, the Eastern division and the B.I.C.C. and the unusual surroundings of the St John College provided an impressive surrounding for the dinner given by the Eastern Board.

### *Canadian Engineers Visiting Britain*

THIRTY-SEVEN engineering graduates have arrived in this country from Canada to take up Athlone Fellowships awarded by the U.K. Government. Before they go off to engineering firms throughout the country and to the Universities they have attended a short "introduction to Britain" programme arranged by the British Council in London this week. They were welcomed by Sir Arthur Fleming, chairman of the managing committee for Athlone Fellowships and listened to talks on British social and economic structure industrial relations and trade unions.

### BRITISH COLUMBIA WANTS BRANCHES OF U.K. FIRMS

AN OPEN invitation to U.K. manufacturers to take a more active part in British Columbian commerce was extended by Mr E. M. Gunderson, vice-president of the Pacific Great Eastern Railway when he addressed Birmingham Chamber of Commerce last week. He asked British manufacturers to establish branch factories in the province to make good the absence of a domestic consumer-goods industry there. A large volume of manufactures was still brought in from Eastern Canada, the U.S. and overseas which could be made locally at lower cost. British Columbia had every hope that the gap in her economy would be filled by the enterprise of U.K. concerns.

Mr Gunderson said the British Columbia Government Power Commission would be buying between two and three million dollars' worth of hydro-electric and other electrical equipment annually for the next five years. British Columbia House, London, would welcome enquiries from any firms interested in bidding for that equipment.

### Import Licences for Spanish Fairs

THE Spanish Ministry of Commerce has issued regulations concerning applications for import licences in respect of next year's Valencia and Barcelona Fairs. The Valencia Fair is to open on 1 May and the Barcelona Fair on 1 June, and are scheduled to close on the 15th of their respective months although an extension for a further five days in each case may be expected. Reports from Madrid following this year's events stressed the need for U.K. manufacturers to keep their names and products before Spanish customers, especially through the Barcelona event. Applications for import licenses should be submitted by 15 Nov. (Valencia show) and by 15 Dec. (Barcelona).

### Plant Manufacture improves in O.E.E.C. Countries

THE market for heavy power station equipment in O.E.E.C. countries is reviewed with reference to its state on 1 April, 1954 in the seventh survey by O.E.E.C. on this subject, published this week. It is stated that during the period April 1954 to Mar. 1955, consignments of power transformers and steam station equipment are expected to increase considerably over the corresponding period of 1953. For large types of thermal equipment, 1954 output is scheduled to be more than 50% over that for 1953. Hydraulic equipment is expected to be delivered at the same rate as last year.

Despite the tendency towards the use of large size units, delivery periods are generally shorter than a year ago. They are even in some cases reduced in comparison with last October. Order books have not changed much from last year, and for thermal equipment they are higher than at the beginning of 1951. For hydraulic turbines, however, orders are down on that year. Orders to hand for power transformers have mounted considerably.

Manufacturers in general estimate that their delivery possibilities will be much greater in 1955 than in 1954, although they are careful about assessing available capacity in 1955. The number of countries producing the largest size equipment has increased. As a general trend, the report suggests that in order to meet the gradually increasing demand for electricity, the electric power industry has established long term development programmes. Manufacturers are not only able to meet present demands for heavy equipment for power stations, but are eager to step-up deliveries considerably in response to a hoped-for acceleration of power plant installation programmes.

# Coal and the Atom

## *Three Forecasts on Nuclear Power Progress*

FORECASTS of how soon electricity generation in nuclear power stations would be helping the nation's fuel balance were made by three of the men intimately concerned last week. Lord Citrine, speaking at the opening of Connah's Quay power station on Thursday (see page 438) said it would be another 15 or 20 years before atomic energy was making a really substantial contribution towards the public supply of electricity. On the same day, at an international congress of chemists in Brussels, Sir Christopher Hinton (managing director, industrial group, Atomic Energy Authority) spoke of nuclear reactors in power stations saving 20 m tons of coal a year within 20 or 30 years' time. (Present B.E.A. annual consumption is about 38 m tons per annum.)

The most complete survey of the immediate prospects was given by Mr L. Rotherham (director of research and development, industrial group, A.E.A.), who on Wednesday afternoon read a paper on atomic energy's contribution to fuel and power resources. The occasion was a two-day conference on fuel problems organised at Sheffield by the Association of British Chambers of Commerce. He forecast very little happening in the next five years, then a gradual building of nuclear power stations. At the end of a decade, nuclear power stations might be producing electricity equivalent in output to one million tons of coal; after that, there would be rapid expansion. This effectively banished from his hearers' minds any thought that nuclear power might provide an early relief for their worries; but Mr Rotherham emphasised his point by prophesying that in twenty years' time, power stations would be using two or three times as much coal as at present.

Another of the speakers at the conference, Sir Hubert Houldsworth, N.C.B. Chairman, said that the coolness of the summer had cost the country 1 m tons of coal reserves. Opencast production was down by 0·6 m tons, of which 0·5 m tons had been lost due to an accumulation of delays in obtaining permission to start operations. Deep mined production was rising, he said. In a telegram he sent to the conference, Mr Geoffrey Lloyd, Minister of Fuel and Power, suggested oil as the bridge between present coal difficulties and future nuclear plentitude.

## Communications is the Theme of 1954-55 Faraday Lecture

THIS session's Faraday Lecture of the Institution of Electrical Engineers is to be delivered in London on 27 Jan. next. Title is "Courier to Carrier in Communications" and has been prepared by Mr T. B. D. Terroni, manager and chief engineer (transmission division) of Automatic Telephone and Electric Co., Ltd. As the title suggests, Mr Terroni will trace the history of communications and man's endeavours to break down the barrier of distance at first by courier who carried messages by hand, then by shouting, by visual signalling and ultimately by carrier in telecommunications. With the aid of films the story extends from the early days of the Persians and Egyptians to the advent of the automatic exchange.

## Hoover Run their Own Works Productivity Campaign

AN all-out effort to increase the standard of efficiency in production so as to increase output while maintaining quality is now being carried out at the Perivale, Merthyr Tydfil and High Wycombe factories of Hoover Ltd. The campaign started at the beginning of this month and will coincide, in its last week, with national Hoover week. Aims and objectives have been compiled, with the co-operation of employee representatives, and the usual incentive bonuses will be awarded for the attainment of those objects. In addition, however, special prizes will be given for efficiency of output and for the best suggestions for raising efficiency.

## Offer of After-Sales Service

WHAT appears to be a most satisfactory after-sales service is now being operated by Elga Products Ltd. This company is giving an assurance that any of their appliances received back in the works during the morning will be returned on the following day. Dealers are invited to contact the company for the detailed service instruction sheets which are freely available to them.

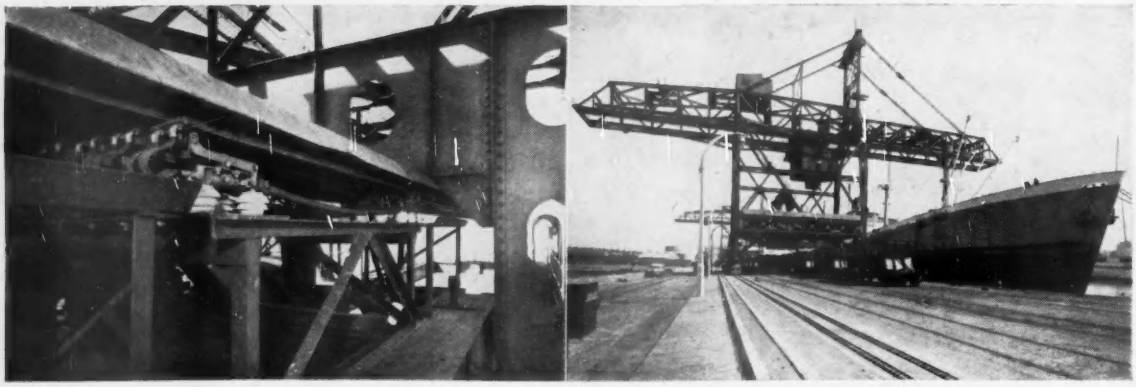
## *Speedy Handling of Iron Ore at Birkenhead*

AN unusual current-collecting system, designed and installed by British Insulated Callender's Cables Ltd., and their subsidiary Construction Co., has been utilised for the power system of the two new electrically operated transporters at Bidston Dock. These transporters are for handling iron ore, either from ship to shore or from ship to barge.

The transporters can travel along the quay for a distance of 1,000 ft and pick up current through collectors which descend through slots into a duct. In the duct are three 1,000 ft copper "T" bars and the current collectors pick up power through 1,000 ampere twin head carbon inserts.

A second system is used for the cross-travelling cranes. The 219 ft long booms along which the cranes run are hinged to permit the 93 ft long outboard end to be raised. Special fittings had therefore to be devised to cope with the hinge. A 3-phase and earth 440 V system is used, and each crane is provided with four main conductors in the form of 1½ in. by 1½ in. by ¼ in. copper "T" bars, as well as four control conductors of grooved copper trolley wire. This necessitated 16 collectors being installed, two being in parallel for each conductor.

The transporters, built by Joseph Booth and Bros., will supply the steelworks of John Summers and Sons, at Hawarden Bridge. Each grab has a capacity of six tons, and each transporter can handle a throughput of over 350 tons/hr.



*New 600-ton transporters at Bidston Dock, Birkenhead. On the left is the current collection equipment*

## SWAN SONG

THE plight of swans who fly into overhead transmission lines at Long Eaton in Derbyshire is the cause of complaints from the local Co-ordinating Committee of Animal Welfare Societies. Five swans have been killed and 20 injured in the past two years by flying into cables which cross a piece of water known as Ballast Hole and belonging to British Railways. The complaints were made to the Ministry of Fuel and Power and an enquiry was sought. The Railway authorities have said it would be impossible to fill in the pond, and the B.E.A. replied that it was technically impossible to put markers on the cables. A report has been prepared by the B.E.A.'s divisional secretary for submission to the Authority.

## Travellers' Schools Appeal

"THE GOOD THAT WE DO and the virtues that we show and particularly the children we rear, survive us through the long and unknown perspective of time," so said Charles Dickens presiding at the 1856 Annual Dinner of the Royal Commercial Travellers Schools. Quoting this Mr Basil N. Reckitt this year's President of Appeal is asking for at least £50,000 to keep the 253 children at the schools maintained, clothed and educated. He would like more to help finance the rebuilding programme which is expected to cost £125,000.

## *Liverpool's Weekly Payments*

REPORTS from Liverpool indicate that negotiations are continuing between the Corporation and the Merseyside and N. Wales Electricity Board over the Council's weekly collection of electricity accounts. Payment of electricity accounts weekly with the rent was introduced among council tenants some 25 years ago, and at present about 22,000 households are said to be taking advantage of the scheme, but the Electricity Board has intimated that the service should be discontinued. Cash collected for the Board last year amounted to about £206,000, and for that service the Corporation charged about 2%. They have now offered to collect the money for a charge of 1½% but this has been declined.

*Part of the L.E.B. marquee at Willesden Civic Show. At the far end is one of two demonstration kitchens and on the right of the photo is the enquiry bureau*

# *L.E.B.'s FIRST EXHIBITION MARQUEE*

THE numerous Agricultural Shows held throughout the country in the summer months have always proved a profitable method of advertisement for all the Electricity Boards except one. Only the London Board is in the unfortunate position of not being able to take advantage of such exhibitions, and consequently it is of note that they embarked on a very similar undertaking earlier this month. The Board took part in the annual Willesden Civic Show, held at Roundwood Park, organising an exhibition of electrical apparatus in a large marquee. A number of manufacturers enthusiastically co-operated and were allocated their own separate stands. Emphasis was on electricity in the home and the continuous demonstrations held throughout the two days of the show attracted attention.

Despite the bad weather and local transport difficulties, some 34,000 people attended the show. The vast majority of these must have visited the L.E.B. marquee judging from the crowds which invariably filled the tent. The organisers have no doubt whatever that resultant business will be good and are looking forward to a repetition next year.

## Are Exhibition Stands too Costly ?

AN allegation that the electricity authorities were spending too much money on their stands at various shows was made at a recent meeting of Newport (Mon) Chamber of Trade. It was stated that between £12,000 and £15,000 was spent on the electricity stand at the Royal Welsh Show held in Cardiff last year. The Chamber was considering the submission of evidence to the committee of inquiry into the electricity supply industry.

## I.T.A. Orders Transmitters

SIX transmitters (three vision and three sound) have been ordered from Marconi's Wireless Telegraph Co., Ltd., by the Independent Television Authority. The vision transmitters have an output power of 10 kW and the sound units, which are amplitude modulated, an output power of 2½ kW. These transmitters are similar to the export models produced by Marconi and will operate in Band III. To assist I.T.A. to start a transmission in London before the end of the year the company will lend I.T.A. the development models of both units.

## Yorkshire drive against smoke pollution

A "domestic smoke campaign" was launched last week in Yorkshire in an effort to lessen the effects of atmospheric pollution in the county. The campaign is being organised by the Solid Smokeless Fuel Federation supported by 44 local authorities who are members of the West Riding Regional Smoke Abatement Committee and the Yorkshire Smoke Abatement Society. The emphasis is on domestic smoke as it is believed that the answer to the problem lies there. Local officials have been successful in a number of instances in persuading local firms and offices to adopt smokeless fuels, thereby creating "unofficial" smokeless zones. Similar success has not been achieved on the domestic side, however, the difficulties being particularly acute in the mining areas of S. Yorkshire where miners have a free allocation of coal.

The new campaign opened officially on 15 Sept with a message of encouragement from Sir Hugh Beaver, and early action was taken in Wakefield with a mobile exhibition and two public meetings. The exhibition is to tour 12 towns and cities within the next month. The month appears to provide an admirable opportunity for electrical dealers to expound the advantages of electricity as a "smokeless fuel" for domestic consumers.

## The First Half-Century

At the British Association Meeting at Cambridge, Mr J. Casey read his paper on The Proposed Barrage of the River Thames. The suggestion was to construct a dam from Gravesend to Tilbury, similar to that across the Nile, with four electrically-worked locks, bridges, etc. The scheme met with little support, Mr Hawksley objecting that its cost would be far in excess of the author's estimate, and that no one would drink Thames water. Mr Alex Siemens insisting on the great value of the tide in the Thames, and Mr Mordey asking why the author should talk of "barrage" when the word "dam" was at his disposal. Sir Hanbury Brown objected that silting up would probably occur below the dam, and Mr Lupton alone supported the author, and asked for a Government inquiry.—*From our issue of 22 September*, 1904.

## Tungsten Lighting Fittings in New Aircraft Offices

TUNGSTEN lighting units supplied by Holophane Ltd., have been used throughout in the new offices of the De Havilland Engine Co., Ltd., at Leavesden aerodrome. A variety of the company's fittings were employed. In the entrance hall, circular Controlens Units were recessed into the ceiling and continued under the canopy for exterior lighting. On the first floor landing above, the choice fell on 14 in. Steplite fittings with three 100 W lamps, which were installed centrally in 3 ft diameter glass laylights in conjunction with prismatic glass translucent reflectors. Lentilite units were employed in the corridors on this floor. Another fitting used was the Correctalite Lumilux 200 W unit, a slightly tinted blue prismatic glass giving partial colour correction to the tungsten lamp. These were installed in the general offices. This installation was planned by Holophane illuminating engineers with the De Havilland Co.

## Nationalisation Unfair

THE allegation that the nationalised electricity supply undertaking holds an unfair advantage over the private trader was made again last week. At a meeting of the Newcastle-on-Tyne Chamber of Trade, reference was made to hire-purchase terms offered by the N.E. Electricity Board, which, it was stated, were more favourable than those which private firms could offer. Mr A. B. Dunford, representing the National Federation of Ironmongers, said that the Board could offset what would be a loss on hire-purchase trading to private traders, through having such enormous resources. No private trader could offer similar terms, he stated.

## Manchester-Sheffield Line

In our short account, published last week, on the occasion of the opening of the Manchester-Sheffield railway electrification scheme, we omitted to mention that the electrical equipment of the electric locomotives was manufactured by Metropolitan-Vickers Electrical Co., Ltd., and that the mechanical parts were the responsibility of British Railways.

## I.E.E. Benevolent Fund

A SLIGHT increase in the income from subscriptions is noted by the Court of Governors in their report on the Incorporated Benevolent Fund of the Institution of Electrical Engineers for the year 1953-1954. This increase is, however, insufficient to cover the expenditure and the Court appeals to two-thirds of the membership of the Institution who do not at present subscribe. If each of these members subscribed 5s. the Court would be able to increase the amount of grants to beneficiaries. These grants amount to £8,845, amounting to approx. £70 for each of the 126 beneficiaries.

*The latest models of Trumeter Co., Ltd.'s road measuring machines recently received much commendation following rigorous tests carried out on Snowdon. A number of improvements have been incorporated, resulting in easier handling and even more accurate measurements. Our photograph shows the designer, Mr R. Howarth, with two companions measuring the Pyg track on Snowdon. For those familar with the path it measures three miles and 1,257 yds to the summit. The apparatus's use in the electrical industry, particularly where the laying of cables is concerned, needs little explanation and we note that it has already been well received.*

## SOUTHEND LINE COMPLETE SOON

FINAL link from Shenfield to Southend Victoria station in the electrification of the London-Southend line, would soon be completed, at a cost of £20 millions, Sir Brian Robertson, B.T.C. chairman, told Passenger Transport delegates at Southend last week.

Complete electrical equipment for 32 four-coach multiple-unit trains to operate on the Southend-Chelmsford extension of the Liverpool St to Shenfield electric railway line has been placed with the G.E.C. by the Transport Commission. Train units will consist of a driving trailer motor coach, trailer and second driving trailer. The motor coaches, will be powered by four axle-hung motors, with series-parallel control by underframe-mounted electro - pneumatic contactor equipment providing automatic acceleration with two full-field and one weak-field continuous running notches. Mechanical parts of the rolling stock will be built at B.R.'s Eastleigh Works.

The electrical equipment will be similar to that provided by the company for the eight three-coach sets operating on the Manchester-Glossop section of the Manchester-Sheffield line since last June.

## IN COURT

### *Dangers in Repair Shop —Company Fined*

A WIGAN firm were recently fined a total of £20 at Liverpool on six summonses concerning breaches of the Factories Act. They pleaded guilty. Mr J. N. Cartwright, H.M. Inspector of Factories, prosecuting, said the company was using the cellar beneath the warehouse for the repair of radio and TV sets unknown to his department. It was found on inspection that the installation was very poor and that there was great danger to employees. In addition to unearthed soldering irons and improper fuses there was a large pool of water on the floor, he said. Mr Cartwright added that as soon as the dangers were pointed out the firm made immediate arrangements to open a new factory elsewhere. In defence, it was said that the accommodation was taken as a temporary measure, and the cellar was used in complete innocence of the fact that they came within the Factories Act.

### *Linesman Killed because Earthing Stick Not Used*

DESPITE warnings, linesmen persisted in not using the earthing sticks provided before touching overhead wires, a district engineer of the N. of Scotland Hydro-Electric Board told an inquiry in Aberdeen last week into the death of a linesman last July. The jury added a rider to their formal verdict that the dead man contributed to the accident by not using the earthing stick, and it was noted also that the circuit diagram drawn up by the Board had not been kept up to date. The explanation as to why the men did not use the earthing sticks before touching the cables was because they thought it a waste of time to check.

On the day of the fatality, power was cut off for a period while lines were inspected but a fuse blew, causing 6ft of wire to become live. Earthing sticks were not used, the dead man's assistant said, because they believed the current was cut off.

### *Lampholder Wrongly Fitted — Man Electrocuted*

A BUILDERS' labourer was electrocuted because an electric lampholder on a length of a cable had been wrongly fitted it was stated at a Westminster inquest recently. A verdict of accidental death was recorded and the jury added a rider recommending that the non-skirted Edison screw type of holder should only be used by experienced hands. The coroner said the recommendation would be forwarded to the appropriate electrical authority. The dead man was working in a lift. Mr. R. Fairey, district engineer for the London Electricity Board, said that the holder, besides being wrongly fitted, had been wrongly used. The type was for low voltage work and should not have been used for temporary work.

## NEWS IN BRIEF

Annual works outing of Lindley Thompson Transformer and Service Co., Ltd., was held on 11 Sept. Five coaches took employees and friends to Southsea.

On page 320 of our issue of 2 Sept., in the article on Filling Compounds, the reference should be to a "viscous oil of the naphthenic type," not napthalene type as stated.

Advance programme of the European Management Conference, to be held at Torquay from 20-23 Oct has been issued. Over 1,000 delegates are expected.

Human skeletons believed to be at least 600 years old have been unearthed by Southern Electricity Board workmen at Potterne. About six skeletons were found lying end to end only 2½ ft below the surface.

Electrification of more local rail lines is included in proposals by Stretford Employment Committee to speed up transport for workers at Trafford Park. It is thought that better transport facilities may ease the acute labour shortage.

Radio and television dealers in the N.E. report greatly increased volume of business since relaxation of hire purchase terms. Demand is greater now than when Pontop Pike was opened, and some dealers cannot meet all requests.

Sixth annual students social evening of the Telegraph Construction and Maintenance Co., took place at the Town Hall, Greenwich, on 10 Sept.

Last week was safety week at the Nechells power stations. The Midlands Division of B.E.A. claims the second best safety record in the country.

Season ticket rates on trolleybuses in Hastings and Bexhill went up by 10% last Sunday (19 Sept).

## *Sayings* OF THE WEEK

*"Between now and the time when substantial contributions are made by nuclear power, it (oil) will be specially valuable to supplement our present fuel and power resources, and so lighten the heavy burden which the coal-mining industry now carries and must continue to carry . . ."* Statement by the MINISTER OF FUEL AND POWER at the conference on Fuel and Power at Sheffield last week.

*"We discovered that the ambition of everyone was to have a TV set. 20% of the people had one already and 80% were working hard to get one . . .* MISS R. CHAMBERS told the National Association of Women's Clubs.

*"In competing with the advertisements of a multitude of products the gas industry was always at a disadvantage, since they were in no position to dramatise what was, after all, a load of solid ironmongery. There was nothing particularly reminiscent of Marilyn Monroe about a coke grate" . . .* Mr R. J. GREGG, publicity manager of the Gas Council told the Scottish Ass. of Gas Managers last Thursday.

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# *ELECTRIC SUPPLY NEWS*

### Cardiff

The possibility of an alteration in the basis of the South Wales Electricity Board's domestic tariff was again discussed by the Corporation's Parliamentary Committee last week. The Corporation have previously made representations calling for a change in the basis of the tariff and put their case to the South Wales Electricity Consultative Council who, in turn, approached the South Wales Electricity Board. But the suggestion to replace the number of rooms by a fixed block tariff was rejected. The Parliamentary Committee last week, were concerned with the particular difficulty that had arisen in assessments for kitchens and sculleries. The possibility of reducing the assessment of very large houses was also discussed. Criticising the Board's decision, Alderman Sir William Williams said that practically nothing was being done for the poorer people. He suggested further consideration should be given to the primary units charge for small houses many of which had the same number of rooms as larger dwellings and to the effect of the tariff on the users of gas-stoves. The matter was referred to a special sub-committee.

### Kilkeel

The Ministry of Health and Local Government has upheld the appeal by the Electricity Board for Northern Ireland against the decision of the Kilkeel U.D.C. that overhead lines should not be used at Knockcree Avenue. The Council had insisted that such cables should be underground. In notifying the Council, the Ministry added that this decision did not preclude the making of any other arrangements between the Board and the Council. The extra cost involved in placing the cable underground will be £57.

### Kincardine

On Saturday next, 25 Sept., Sir Duncan Watson, a former member of the North of Scotland Hydro-Electric Board, will perform the ceremony at the old parish church of Kinnef, which now has its electrical installation. This comes in the Board's £250,000 scheme in Kincardine, covering an area from Newtonhill West, to the foothills of the Grampians and to the North Esk at the south end of the county. There are nearly 500 farmers in the 1,000 consumers under the scheme. A total of 2,800 h.v. and 3,600 l.v. poles will be erected and 220 miles of cable and 200 transformers will be required to complete the scheme.

### Londonderry

With a limited supply to the Electricity Board for Northern Ireland, the Londonderry Corporation's power station capacity will be sufficient to deal with the demand in the city until 1956 or 1957, and without a supply to the Board, until about 1960. This information was given by Mr R. V. Macrory, the city electrical engineer, at a meeting of the Corporation Electricity Committee last week, when he reported on a conference that had taken place at the request of the Joint Electricity Committee to consider the question of providing for future electrical development in the city and in the North-West area of the Board. After explaining that those dates had been arrived at from statistics of estimated future demands, Mr Macrory said that the Joint Committee submitted details which indicated that the Belfast and Ballylumford stations also would be running at full capacity at approximately the same time and they were anxious to continue to purchase a limited supply from Londonderry for as long as possible. If the site adjacent to Londonderry was decided upon for a major station, the operational position might be as follows: "If the Corporation invited the Joint Committee to make a declaration that the existing Londonderry station should become a designated station under the provisions of the 1948 Act, and if the Committee assented thereto, it was likely that the new scheme of providing and operating a major station would be entrusted to the Corporation, which station would also become a designated station. The Corporation would then sell their entire output to the Committee at cost of production which would safeguard the Corporation against any loss." The Corporation are to be kept informed of any developments.

### North of Scotland

The North of Scotland Hydro-Electric Board have prepared a constructional scheme No. 73, under which it is proposed to erect 132 kV transmission lines in Kilmonivaig and Kilmallie, Inverness-shire, from a point near Loch Lundy to a transforming station to be erected near Fort William.

### LIGHTING SCHEMES

**Chapel.** The parish Council has instructed the North Western Electricity Board to proceed with the installation of various new and additional lamps. Estimated cost is £771.

**Doncaster.** The M.o.T. has approved the expenditure of £7,190 on various improved lighting in the town.

**Helston.** It was suggested at the local Chamber of Commerce that the gas street lighting should be converted to electricity in stages as funds become available.

**Kidsgrove.** U.D.C. is applying for consent to borrow £22,000 for the Newchapel street lighting scheme.

# COMPANY ACTIVITIES

A DARK cloud in the blue sky of the electrical manufacturing industry is the price of copper. It seems hardly a few months ago that the industry was grumbling at the unstable condition of the copper market. But now, instead of being uncertain and tending to fall, the price has risen to just over £253 a ton as compared with £231 a ton at the beginning of the year. Conditions in Rhodesia have improved of late but there has been a lot of trouble at the Chilean copper mines. Last week the Chilean Government suspended negotiations for the sale of copper and even held up several important long-term contracts, in view of the total shut-down of several mines at the time. As a precautionary measure, shipments of metal at the loading ports were also held up.

The U.S. has been affected most so far. On August 31 domestic stocks of refined copper there were 58,387 tons, a drop of 10,534 tons on the month. The present figure compares with 135,759 tons on March 31, which represents the highest levels for the year. In this country most stocks are held privately. The official holdings were about 280 tons down, refined stock being 1,345 tons and rough 240 tons.

Underwriting has been completed for a public issue of £2,250,000 4½% Debenture Stock 1975/80 at a price of £98. 10s. per cent in the British Tabulating Machine Co. The subscription lists will open and close today, Thursday. I expect a big demand for this issue and a substantial premium on the issue price when dealings commence. Gross redemption yield to the latest maturity date is nearly £4. 7s.%, free of stamp duty. Even at 100% the stock would probably still be a winner and that is the sort of opening price the market expects. The company's speciality is the "Hollerith" punched card machine and other tabulating machines which it manufactures and hires out.

I like the cheery optimism of Mr Raymond Berry, the chairman of Berry's Electric Ltd. Although only part of the year under review was prosperous (it included the recession which affected the sale of electrical appliances), the company's trading profits and other income soared from £50,314 to £91,870. Since the end of the recession Mr Berry told the shareholders that they had experienced an unprecedented demand. The export of "Magicoal" fires to 41 countries including the United States, increased by 25%. And he expected to double last year's rate during the current year. Demand is now so great for electric fires and water heaters that it is in excess of the group's maximum output. "As we approach the age of nuclear power and all-electric homes," said Mr. Berry, "I believe that the popularity of electric fires will continue to increase."—*From our City Correspondent.*

### Bagdad Light and Power Co. Ltd.

For 1953, the net profit is £102,906 (*£93,328*). The dividend is 8% tax free (*7½% net*).

### British Electric Traction Co. Ltd.

The C.I.C. has approved the capitalisation of part of the reserves for the scrip issue to the holders of Deferred and "A" Deferred Ordinary stock in the proportion of two 5s. "A" Deferred Ordinary shares for every 5s. unit of stock held.

### British Relay Wireless and Television

The group trading profit for the year ended 30 April last is £267,192, compared with £218,248 a year earlier. A final dividend of 11%, makes a total of 16% for the year (*nil*).

### Chloride Electrical Storage Co.

It is announced that Lazard Bros. and Co. has agreed to purchase from the Electric Storage Battery Co. of Philadelphia its £1,573,688 holding of Chloride "A" Ordinary stock. This stock is to be offered in the near future at 63s. free of stamp per £1 stock.

### Christy Bros. Ltd.

The trading of the parent company shows a contraction of about 12½% as compared with the previous year, due to one or two of the larger contracts having been completed, Mr A. A. Gates, the chairman, explains. In spite of keen competition, contracts in hand are up to the average, and in the Works Department the manufacture of switch and other panels for special purposes is being expanded. The electricity undertaking of

| Year to 31 Mar. | £ Trading Profit | £ Net Profit | % on Ord. Earned | % on Ord. Paid | Ord. Price High | Ord. Price Low |
|---|---|---|---|---|---|---|
| 1950 | 85,689 | 30,472 | 35 | 6 | 24/– | 18/3 |
| 1951 | 93,282 | 32,176 | 36 | 6 | 27/– | 21/4 |
| 1952 | 83,829 | 23,802 | 21 | 7 | 22/3 | 18/9 |
| 1953 | 102,541 | 33,823 | 27 | 7 | 22/3 | 16/9 |
| 1954 | 95,471 | 29,969 | 21 | 7 | 24/– | 19/3 |

the associated company in Alderney (C.I.) is progressing satisfactorily, he adds, and the accounts for the first complete twelve months ended 31 Dec. last showed a profit sufficient to pay a maiden dividend of 2½% after a substantial sum had been provided for depreciation. An increasing number of consumers are hiring cookers, water heaters, etc.

### E. K. Cole Ltd.

It is announced that the consent of the Capital Issues Committee has been received for a one-for-one scrip issue to shareholders. It is proposed to capitalise the £400,000 of share premiums resulting from the recent cash issue plus £19,075 from the profit and loss account for a distribution of 1,676,300 5s. Ordinary shares. These new shares will be entitled to all dividends in respect of the year to 31 Mar. next. But the doubling of the Ordinary capital, it is stated, should not be taken to indicate an increase in the total distribution.

### Electric Construction Co. Ltd.

Subject to consent of the Capital Issues Committee, the directors propose to capitalise £462,315 of reserves and to distribute one new £1 Ordinary share for every £1 of Ordinary stock held.

### Eveready South Africa Ltd.

The net profit for the year ended 30 June, after charging depreciation £12,863 (*£7,061*) and taxation £37,041 (*£32,220*), is £85,373 compared with £73,247 for the previous year. The directors recommend a final dividend of 9d. per share making a total of 1s. 3d. per share for the year (*same*).

### James Howden and Co. Ltd.

The group profit, before taxation, for the year ended 30 Apr. last, is £804,283, compared with £787,073 for the previous period. There is a final dividend of 15% on the doubled capital, making a total of 22½% for the year, as against 30%.

### Palestine Electric Corporation Ltd.

With additional generating plant, over 860 million units were produced last year. In all 722·6 million units were sold, an increase of 13·3%. Consumers connected at 31 Dec. last, numbered 251,152 compared with 231,722 at the end of 1952. Considerable extension work was carried out in the course of the year on the transmission and distribution system, making a total of 2,477 km of h.t. lines and cables and 2,337 km of l.t. distribution

| Year to 31 Dec. | £ Gross Revenue | £ Net Profit | % on Ord. Earned | % on Ord. Paid | Ord. Price High | Ord. Price Low |
|---|---|---|---|---|---|---|
| 1949 | 4,008,000 | 328,015 | 14 | 5 | 35/6 | 27/6 |
| 1950 | 4,883,000 | 352,383 | 10 | 5 | 24/10 | 19/– |
| 1951 | 5,768,000 | 147,101 | 3 | — | 23/1 | 16/– |
| 1952 | † | –145,041* | — | — | 16/6 | 9/6 |
| 1953 | | 487,616 | 14 | — | 19/9 | 7/9 |

*Loss. †Not disclosed.

line in operation at the end of 1953. A new 110 kV line was built to Jerusalem. We have already referred to the Israel Government's offer to purchase the Ordinary and "A" Ordinary shares. It has been agreed that within one month after registration of the purchase of the shares by the government, the present directors will resign as a body, having convened an extraordinary meeting for the purpose of electing new directors. In his valedictory statement, Viscount Samuel briefly surveys the history of the company from its early beginning, showing that generating capacity was 2,250 kW in 1926, and by 1954 had risen to 230,000 kW.

### Dividends Declared

*Allbright and Wilson Ltd.* Interim 7% (5%). It is stated that the increase is to bring the interim more into line with the total distribution.

*British Ropes Ltd.* Interim of 4% (3%).

*W. T. Henley's Telegraph Works Co.* Interim of 2½% (*same*).

# COMMERCIAL INFORMATION

## Contracts Open at Home . . .

*Dates given are the final for receipt of tenders unless otherwise stated.*

**25 Sept.—Failsworth U.D.C.** Group B columns with sodium discharge and tungsten lamps for Pole Lane and Poplar St. —See 16 Sept. issue.

**25 Sept.—Lanark C.C.** Electrical work in proposed police station and houses at East Kilbride, Westwood, and Shawsburn. Apply to W. R. Watt, county architect, 34 Albert St, Motherwell, by above date.

**27 Sept.—Co. Down.** Installation in 72 houses at Ballynahinch.—See 16 Sept. issue.

**27 Sept.—Dartford T.C.** 82 complete lighting units along trunk road A.2 and Princes Rd North.—See 16 Sept. issue.

**27 Sept.—Haslingden T.C.** Rewiring of heating circuits in 44 houses. Borough Surveyor, Municipal Offices. Deposit £1. 1s.

**27 Sept.—Lancs C.C.** Electrical installation at Denton Central County School. Sub-contractors to apply to County Architect, County Hall, P.O. Box 26, Preston, by above date.

**27 Sept.—Oswestry T.C.** Installation in 76 houses on Middleton Rd estate.—See 16 Sept. issue.

**27 Sept.—Plympton (Dev.) R.D.C.** Seven sets electrically driven sewage pumps.—See 19 Aug. issue.

**28 Sept.—N. Ireland.** Electrical installation in new home for nurses at Waveney and Braid Valley Hospitals, Ballymena. Chief Engineer of Hospitals Authority, Victory Buildings, Queen St, Belfast. Deposit £3. 3s.

**30 Sept.—Colne T.C.** Sodium discharge lamps with concrete columns in Keighley Rd.—See 16 Sept. issue.

**30 Sept.—Dublin T.C.** 6,000 yd of underground cable for public lighting dept.—See 16 Sept. issue.

**30 Sept.—Durham.** Electrical equipment for Walworth Castle residential school. —See 16 Sept. issue.

**30 Sept.—Manchester T.C.** Supplies required in year from 1 Jan.—See 16 Sept. issue.

**30 Sept.—Thetford T.C.** Concrete columns to group "A" with lamps, lanterns and auxiliary equipment along A 11. —Advertised in 26 Aug. issue.

**1 Oct.—Dublin T.C.** Installation at 25 and 26 Upper Merrion St.—See 16 Sept. issue.

**1 Oct.—Middleton T.C.** Installation in 80 houses on Hollin estate.—See 9 Sept. issue.

**2 Oct.—Carlisle T.C.** Electrical installation in 200 dwellings. City Surveyor, 18 Fisher St.

**2 Oct.—Inverness.** Installation in 22 houses in Beauly housing scheme.—See 16 Sept. issue.

**2 Oct.—Middleton T.C.** Sodium vapour and tungsten units with concrete columns for group B street lighting on Langley Neighbourhood Unit Development.—See 16 Sept. issue.

**2 Oct.—Newburn-on-Tyne U.D.C.** Installation in 11 bungalows at Newburn and 32 houses on West Denton estate. J. A. Weatherley is Council Surveyor.

**4 Oct.—Burnley T.C.** Pumping and electrical equipment for proposed water booster station.—See 16 Sept. issue.

**4 Oct.—Morecambe and Heysham T.C.** Electrical installation in total of 64 houses and 36 flats in Branksome Drive, and in four shops and eight flats in Trumacar Lane. Borough Surveyor. Deposit £1.

**5 Oct.—Liverpool T.C.** Electrical installation at Wellesbourne Rd County Primary School. City engineer and surveyor, Municipal Buildings, Liverpool 2.

**6 Oct.—Dublin T.C.** Installation of a bed lift at Hume St Hospital. Specification, etc., from McDonnell and Dixon, 20 Ely Place, Dublin. Deposit £5. 5s.

**6 Oct.—Skelton and Brotton (Yorks) U.D.C.** Supply of electrical fittings for 18 houses on Coach Rd estate. Engineer and Surveyor, Council Offices, Skelton.

**6 Oct.—Wembley T.C.** Dismantling of gas street lamps and erection of 471 45 W or 60 W sodium vapour discharge lamps for conversion scheme. Borough Treasurer, Town Hall. Deposit £2. 2s.—Advertised in this issue.

**9 Oct.—Dublin T.C.** Supply and delivery of 1,000 W Duoflux reflector fittings for Public Lighting Department. P. J. Hernon, city manager and town clerk, City Hall, Dublin.

**9 Oct.—Inverness.** Installation in 24 houses at Kiltarlity.—See 16 Sept. issue.

**11 Oct.—Esher U.D.C.** Repair and renewal of electrical installation in Council Offices (main block). Engineer and surveyor, Council offices, Esher. Deposit £1. 1s.

**11 Oct.—Kirkcaldy.** Electrical work in proposed new C. of S. church at Templehall, Kirkcaldy. Apply to J. Gentles and Son, quantity surveyors, Osborne Hse, Kirkcaldy.

**11 Oct.—Lurgan (N.I.) T.C.** Lighting and power installation at Castor's Bay waterworks.—See 9 Sept. issue.

**12 Oct.—Grantham T.C.** 668 concrete columns and wall brackets with lanterns and control gear.—Advertised in 16 Sept. issue.

**12 Oct.—Wellington (Salop) U.D.C.** Supply, erection of 31 class A 140 W sodium lighting units with concrete columns. Service to lamps will be by Midlands Electricity Board. A. G. Barton, Engineer and Surveyor, Council Chambers, Walker St. Deposit £2. 2s.

**14 Oct.—Grimsby T.C.** Installation in new police H.Q.—See 9 Sept. issue.

**15 Oct.—Strabane (N.I.).** Wiring of Strabane Presbyterian church.—See 9 Sept. issue.

**19 Oct.—Leeds.** New electrical installation at St. Thomas's Hospital, South Foreshore, Scarborough. Apply to architect of the Leeds Regional Hospital Board, Park Parade, Harrogate, by 30 Sept. Deposit £2. 2s.

**20 Oct.—Newcastle-on-Tyne T.C.** Electrical installation in 68 flats and maisonettes in five storeys on Elswick St site. City Architect, 18 Cloth Market.

**29 Oct.—Oswaldwistle U.D.C.** Installation in 32 dwellings on White Ash Estate. —See 16 Sept. issue.

**No date stated.—Wigtown.** Installation in 84 houses at Kirkcowan and Dunragit.—See 9 Sept. issue.

## . . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.*

**8 Oct.—New Zealand.** 1,500 yards of 22 kV cable 0·35 sq in., eight straight-through joint boxes, for Auckland E. Power Board. Tenders to the chairman, at Queen St, Auckland, N.Z. B.o.T. (Ref.: 22057/54).

**11 Oct.—Brazil.** Supply and installation of underground cables for State Electricity Commission, Porto Alegre, Rio Grande do Sul. Apply to the Turma de Comunicocoes e Arquivos, Comissao Estadual de Energia Eletrica, Edificio Nova de Prefeitura, 11. andar, Porto Alegre, Rio Grande do Sul, Brazil. B.o.T. (Ref.: ESB 2143/54).*

## Your Queries Answered

*Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries*

***A Selection from the 120 queries answered this week***

**"Simplex" cable drum jacks,** makers of? B.I.—Equipment and Engineering Co., Ltd., 2/3 Norfolk St, W.C.2.

**"Vestaray" shop window reflectors,** makers of? B.B.—S. and W. (Lighting) Ltd., Brierley Hill Glassworks, Brierley Hill, Staffs.

**"Gregg" plugs,** makers of? W.S.—Gregg Electrical Industries Ltd., 25a Albert St, Birmingham 4.

**"Acme" transformers,** makers of? L.E. —Hinchley Engineering Co., Ltd., Pans Lane, Devizes.

**"Rubicon" thermostats,** makers of? P.C. —Controlled Heating Units (London) Ltd., Avenue Rd, Hampton, Middlesex.

**Hartmann and Braun,** of Frankfurt, agents for? L.P.E.—Kandem Electrical Ltd., 711 Fulham Rd, S.W.6.

**Domestic electric wringer,** makers of? P.E.—Acme Wringers Ltd., David St, Glasgow.

**"G. and G." formers for fire elements,** makers of? D.Y.—Gaskell and Grocott Ltd., Whitehall Works, Longport, Stoke-on-Trent.

**11 Oct.—India.** Supply of h.t. and l.t. cables and accessories. Documents from Chief Engineer, Bombay Port Trust, Ballard Rd, Fort, Bombay, at Rs. 15.

**13 Oct.—South Africa** (*a*) Ten 3-ph., 750 kVA transformers and seven 300 kVA 1-ph. transformers; (*b*) twenty 3-ph. 750 kVA transformers with on-load tap changing, or twenty 750 kVA transformers with voltage regulating equipment, for City of Cape Town. Copies of details and drawings to be sent to Merz and McLellan, Carliol Hse, Newcastle-upon-Tyne. Tenders to city electrical engineer, Electricity House, Strand St, Cape Town.

**14 Oct.—Uruguay.** Administracion General de las Usinas Electricas y los Telefono del Estado, requires 1,200 metres of submarine cable and accessories. Specification No. 4085/54. B.o.T. (Ref.: ESB 21625/54).*

**16 Oct.—Uruguay.** 3,000 dry rectifiers for Administracion General de Las Usinas Electricas y los Telefonos del Estado. B.o.T. (Ref.: ESB 22536/54).

**18 Oct.—India.**—Pin insulators, 20,500 for 11 kV and 16,100 for 33 kV; 6,600 11 kV strain insulators and 3,600 33 kV strain sets; for Government of Andhra. Executive Engineer, Electrical and Mechanical Division, 20 Rutland Gate, Nungambakkam, Madras 6. B.o.T. (Ref.: ESB 22491/54).

**19 Oct.—Pakistan.** Dept. of Supply and Development, Frere Rd, Karachi, requires supply of quantities of isolators, circuit-breakers and transformers. B.o.T. (Ref.: ESB 21717/54).*

**20 Oct.—India.** 17,500 6·6 kV pin insulators with "I" pins, ditto with "J" pins, and 5,500 6·6 kV shackle insulators, for Government of Andhra. Electricity Dept., 20 Rutland Gate, Nungambakkam, Madras 6. B.o.T. (Ref.: ESB 22492/54).

**20 Oct.—Uruguay.** Supply of total of 1,300 mts armoured cables and accessories for Administration General de las Usinas Electricas y los Telefonos del Estado, Montevideo. Specification No. 4089/54. B.o.T. (Ref.: ESB 21626/54).*

**21 Oct.—Uruguay.** For public lighting: 500 enamelled iron mounts, reflectors, and 2,850 round opal glass globes. B.o.T. (Ref.: ESB 22147/54).

**26 Oct.—Burma.** Supply of 116 transformers for rural electrification scheme required by Electricity Supply Board, Union of Burma, 153 Ahlone Strand Rd, Rangoon. B.o.T. (Ref.: ESB 21862/54).*

**16 Nov.—Australia.** Twelve split-cone multi-range current transformers, for Sydney, C.C. General manager, Queen Victoria Building, George St, Sydney. B.o.T. (Ref.: ESB 22511/54).

**26 Nov.—Australia.** Twelve 11 kV, 3-ph., 300 A outdoor oil-immersed, ring-main switchgear, for Brisbane T.C. Town Clerk, City Hall, Brisbane. B.o.T. (Ref.: 22028/54).

**26 Nov.—India.** Tenders (No. SE2/2127-E/111) invited for supply of 130 oil circuit-breakers under Tech. Co-operation Administration Programme. Documents from Director-General of Supplies and Disposals, Shahjahan Rd, New Delhi, at Rs. 6. B.o.T. (Ref.: ESB 21436/54).*

**25 Jan. 1955.—New Zealand.** One 30,000 kVA, 110/22 kV transformer bank and spare unit for Otahuhu substation, for State Hydro Electric Dept, comprising four 1 ph. double-wound transformer units, each 10,000 kVA, 110/12·7 kV, outdoor type, oil immersed, with natural cooling and on-load tap changing. Details from N.Z. Government office in London.

# PRICES of cable metals and other materials

***Figures quoted are the official prices ruling on Tuesday, 21 September***

| | £ per ton | Weekly change £ | Price last year £ |
|---|---|---|---|
| COPPER, standard class A (settlement) | 255½ | +7½ | 233½ |
| ,, (3 months) | 244½ | +4½ | 219½ |
| LEAD, refined pig, min. 99·97% purity (cash) | 101 | +1 | 91½ |
| ,, (3 months) | 99 | −1 | 87⅛ |
| TIN, refined, min. 99·75% purity (settlement) | 737½ | −2½ | 616½ |
| ,, (3 months) | 737 | −1 | 603½ |
| ALUMINIUM, ingots 99-99·5% | 150 | — | 150 |
| ZINC, virgin, min. 98% purity (cash) | 80⅜ | −1 | 70½ |
| ,, (3 months) | 80½ | −⅜ | 68⅛ |
| RUBBER No. 1, RSS. spot (per lb.) | 20⅝d. | −⅛d. | 18⅛d. |
| ,, c.i.f. basis, ports. Nov. (per lb.) | 20⅛d. | −⅛d. | 18⅛d. |
| ARMOURING: | | | |
| Galv. Steel Wire (0·104 in.) | 52½ | — | 50½ |
| Mild Steel Tape (0·014 in.) | 40½ | — | 40 |

# Gazette Announcements

## COMPANIES ACTS

**Furn-Art Ltd.** Mr H. J. Newton, 139a High St, Epsom, appointed liquidator on 3 Sept.

## BANKRUPTCY ACTS

*First Meeting*

**Salisbury.** William H. T. Mason trading as W. H. Mason and Son at Castle St, Mere, Wilts. First meeting at Official Receiver's Office, 54 Endless St, Salisbury, on 28 Sept., at 2.30 p.m., and public examination at the Guildhall, Salisbury, on 4 Nov. at 2.30 p.m. Date of receiving order, 9 Sept.

*Intended Dividend*

**Chelmsford.** Woolley, Gordon Percy, electrician, 28 Queen St, Southminster. Last day for receiving proofs, 1 Oct. Trustee, W. J. W. Hill, 58-61 York Ter, Regents Park, N.W.1.

*Receiving Order*

**High Court of Justice.** Robert, Ralph Hume, electrician, formerly of Power House, 16 Lodge Rd, Maldon, Essex.

*Release of Trustee*

**Aylesbury.** Sharp, Leonard George, electrician, 4 Summerley's Rd, Princes Risborough. Trustee, J. H. Marshall, 55 North St, Thame. Date of release, 20 Aug.

# Contracts Placed

**B.E.A.** Contracts have been placed by the B.E.A. during the past few weeks for power stations, transforming stations, and transmission lines amounting in the aggregate to £19,575,572. The principal contracts include: Littlebrook C power station: H.P. pipework and valves, C. A. Parsons and Co., Ltd.; Goldington power station: One 300 klb/hr boiler, Clarke, Chapman and Co., Ltd.; South Denes power station: Coal unloading plant, Mitchell Engineering Ltd., and coal elevating and conveying plant, International Combustion Ltd.; Castle Donington power station: Subsidiary buildings, Taylor Woodrow Construction Ltd., and one 106 MVA, 275 kV, transformer, Metropolitan-Vickers Electrical Co., Ltd.; Drakelow A power station: Two 515 klb/hr boilers, International Combustion Ltd.; Drakelow B power station: One 120,000 kW turbo-generator, condensing, feed heating and evaporating plants, C. A. Parsons and Co., Ltd.; Willington A power station: Structural steelwork, Edward Wood and Co., Ltd., and coal handling plant, the New Conveyor Co., Ltd.; Hams Hall C power station: Three 60,000 kW turbo-generators, General Electric Co., Ltd.; Condensing and feed heating plants for three turbo-generator sets, Worthington-Simpson Ltd., and chimney and main flues, D. Theaker and Co., Ltd.; Bold A power station: One 60,000 kW turbo-generator, General Electric Co., Ltd., and condensing and feed heating plants for one 60,000 kW turbo-generator, Hick Hargreaves and Co., Ltd.; Connah's Quay power station: Two 300 klb/hr boilers, International Combustion Ltd., two 30,000 kW turbo-generators, condensing and feed heating plants, C. A. Parsons and Co., Ltd., and 3,300 V and 415 V auxiliary switchgear, A. Reyrolle and Co., Ltd.; Dolgarrog hydro-electric scheme: Extension of catchment, John Laing and Son, Ltd.; Elland power station: Site clearance, road and railway embankments, flood protection banks, access roads, etc., Holland and Hannon and Cubitts Ltd.; Ferrybridge B power station: Site clearance, road and railway embankments, flood protection banks, access roads, etc., Holland and Hannon and Cubitts Ltd.; cooling tower, Davenport Engineering Co., Ltd.; Wakefield power station: Three 550 klb/hr boilers, Foster Wheeler Ltd., and turbo-generator condensing plant, Worthington-Simpson Ltd.; Carrington power station: Superstructure, M. J. Gleeson (Contractors) Ltd.; Chadderton power station: Three 360 klb/hr boilers, Simon-Carves Ltd.; Huncoat power station: Condensing and feed heating plant for one 30,000 kW turbo-generator, Hick Hargreaves and Co., Ltd.; Portobello power station: One 540 klb/hr boiler, International Combustion Ltd.; Dalmarnock power station: H.P. pipework and valves, Stewarts and Lloyds Ltd.; Brighton (Fishergate) substations: 33 kV, 730 MVA switchgear, A. Reyrolle and Co., Ltd.; Norwich substations: 33 kV, 750 MVA switchgear, A. Reyrolle and Co., Ltd.; Stella West substation: 275 kV, 7,500 MVA switchgear, A. Reyrolle and Co., Ltd.; Yarmouth-Norwich and Ipswich-Yarmouth: 132 kV lines, W. T. Henley's Telegraph Works Co., Ltd.; and Monk Fryston-Skelton Grange: 275 kV o.h. line, Balfour Beatty and Co.

# BUSINESS PROSPECTS

**Abertillery U.D.C.** Erection of 86 dwellings and 34 houses on Swffryd site B, nr. Crumlin. H. J. Williams, clerk of council, Council Offices.

**Alloa (Clackmannan) T.C.** Dept. of Health approved erection of 34 houses on Keilarsbrae Development site.

**Antrim.** Approval granted for erection of factory at Dunmurry for R. Moffeld and Sons, Ltd., Finaghy. Cost estimated at £20,000.

**Armagh.** Approval given for erection of R.C. church at Aughanduff, Mullaghbane.

**Ashford (Kent) U.D.C.** Construction of 65 dwellings at Beaver Green Farm. Surveyor to Council, 5 North St.

**Ballycastle (Antrim).** Erection of new intermediate boys' and girls' school at Sheksburn. W. H. McEvoy, Quantity Surveyor, Ulster Bank Chambers, 73 May St, Belfast.

**Barnsley.** Plans approved for factory in Queen St. South for Legard and Son Ltd.

**Barry (Glam).** Down Chemical Co., Canada, to build factory in district.

**Batley T.C.** It is proposed to erect 14 dwellings on Staincliffe estate and 24 houses on Fieldhead estate.

**Bedlington (Northumb).** U.D.C. planning the erection of 1,000 houses at Guide Post and Creswell Hill Farm site.

**Belfast.** C. Lord, Ballywilliam, to erect factory at Donaghadee.

**Biggin Hill (Kent).** Architects for new church of St. Mark are Sir Giles Scott, Son and Partners, 3 Field Court, Gray's Inn, W.C.1.

## TRADE MARKS

*This information is extracted from the Official Journal by permission of the Controller.*

**Lumisyne.** 731,404. Class 9. Luminous signs. Allied Art Industries Ltd., 71/75 Barrack Rd, Leeds 7.

**Morphy-Richards.** 722,708. Class 7. Mixing, mincing and hair drying machines. 722,709. Class 9. Bells, bell systems, buzzers, etc. 722,710. Class 11. Cooking apparatus, fans, etc. Morphy-Richards Ltd, St. Mary Cray, Kent.

**Clareliac.** 726,876. Class 9. Electrical instruments. Clare Instrument Co., 1 Beaconway, Rickmansworth, Herts.

**Rai-Tel-Ade.** 729,638. Class 9. Attachments for wireless and television apparatus. Electric Ades, 2 Orchard Hse, Thames St, Sunbury-on-Thames.

**Falks.** B 730,037. Class 9. Electrical apparatus and instruments. B730,038. Class 11. Installations for lighting, etc. Falk, Stadelmann and Co., Ltd., 91 Farringdon Rd, E.C.1.

**Invincible.** 730,290. Class 7. Washing, wringing machines, etc. Co-operative Wholesale Society Ltd., 1 Balloon St, Manchester.

**Aeroflex.** 725,289. Class 9. Electric fuses, fuse carriers, cut-outs, switches and switchgear. Parmiter, Hone and Sugden Ltd., Fluvent Electrical Works, Newton Ave, Longsight, Manchester.

**Rob Roy "Handymaid."** 731,154. Class 9. Electric flat irons. Scottish Precision Engineering Co., 27 Cadogan St, Glasgow, C.2.

**President.** 731,418. Class 9. Electric floor polishing machines. Bylock Electric Ltd., 109 South St, Ponders End.

**Birmingham.** Greville Trimmers Ltd., of 298 Latimer Rd, London, W.10, are to erect factory on Central depot site. Plans being prepared by D. Adshead Grant, architect, 40 Norland Sq, London, W.1.

**Blyth.** Offices to be built in Waterloo Rd, by Min. of Works for Ministries of Labour, National Insurance and Pensions, and National Assistance Board.

**Bradford.** Laboratory proposed Bradford Dyers' Assoc. Ltd., behind Exchange station.

**Bridgend (Glam).** Inquiry to be held into proposed erection of public hall and civic restaurant at cost of about £25,000.

**Buckinghamshire.** Construction of police headquarters at Slough. County Architect, County Offices, Aylesbury.

**Burnley T.C.** Ernest Griffiths and Sons will be consultants for heating and electrical installation at High School for Girls, Ivy Bank, and for electrical installation at Towneley Technical High School for boys.

**Buxton.** Development of an industrial estate at Grin Works proposed by G. W. Eves Ltd. Plans approved.

**Chester.** Edward Dean and Sons (Millers) Ltd., Upton Mill, to erect new factory.

**Coatbridge (Lanark) T.C.** Layout plan approved for 186 houses and four double shops at Kirkshaws. Architect is T. Smith, 3 Church St.

**Eastbourne.** New Winter Gardens are estimated to cost £265,000. Architects are Easton and Robertson, 5 Bedford Sq, London, W.C.1.

**Eccles (Lancs).** Scheme for single-storey factory for Synthetic Supplies Ltd, Silk St, has been approved.

**Edinburgh.** Dean of Guild Court has granted warrant for erection of 5-storey neurosurgical dept. at Western General Hospital in Crewe Rd. Estimated cost is £300,000.

**Edinburgh.** Dean of Guild Court has approved erection of £67,000 factory by Laidlaw, Drew and Co., Ltd., of Leith.

**Ellesmere Port U.D.C.** Construction of 100 flats and maisonnettes on North Whitby estate. Engineer and Surveyor, Queen St.

**Epping U.D.C.** Construction of 28 flats on Beaconfield estate. Surveyor, 91 High St.

**Falkirk T.C.** Dean of Guild Court has approved plans for 66 houses on Glenfuir site. Estimated cost £87,000.

**Guisborough U.D.C.** Layout plans approved for further 56 houses on Lazenby site to cost £91,166.

**Haslingden (Lancs).** Durie and Miller Ltd., of Stacksteads, Bacup, propose to erect factory costing about £150,000.

**Higham Ferrers T.C.** Revised layout for 70 dwellings near Simpson Ave, has been approved in principle.

**Honiton (Dev.) T.C.** Erection of 49 dwellings on Jerrards estate. Borough Architect, A. Lamb, 2 Prospect Place, Ottery St. Mary.

**Hornsey T.C.** Construction of 20 flats and 4 maisonnettes in Victoria Rd. Borough Engineer and Surveyor, Town Hall, N.8.

**Huntingdon.** New factory to be built opposite existing premises for Silent Channel Co., Ltd., Ferrars Rd. Quantity surveyors are Henry Riley and Son, 82 Victoria St, London, S.W.1.

**Kenilworth U.D.C.** Erection of 28 flats and 80 houses on Dalehouse Lane sites. Surveyor, Council House.

**Lanarkshire.** Offices and extensions at Mossend planned by Clyde Crane and Engineering Works Co., Ltd. Architect is G. L. Thompson, 16 New Walk Terr, York.

**Lincolnshire.** Black Sluice Internal Drainage Board propose to build electrically operated land drainage pumping station at Ewerby Fen, nr. Heckington.

**Llanelly R.D.C.** Erection of 60 houses on Capel No. 2 site. Council's Architects, 4 Queen Victoria Rd.

**Redcar.** Site in Kirkleatham Lane to be bought by North Riding C.C. for county modern school. Architect is D. W. Dickenson, County Hall, Northallerton.

**Scarborough T.C.** Erection of 106 houses on Eastfield and Castle Ward estates. Borough Engineer is H. V. Overfield.

**Shrewsbury.** Work expected to begin within next 12 months on large factory in Harlescott Lane for Corsets Silhouette Ltd., of Coton Hill.

**Southgate.** Application made to T.C. for two-storey factory extension at Rossendale works for James Haworth and Bro. Ltd., 21 Soho Sq, London, W.1.

**South Shields T.C.** Work expected to start next Jan. on erection of 134 houses on Whiteleas estate and six shops and flats in Centenary Ave.

**Sunderland T.C.** Ministry has authorised Council to proceed with plans for erection of 630 houses on Hylton Red Hse extension.

**Sunderland T.C.** Quantity surveyors for proposed Castle View county primary junior school are Martin and Felton, Lloyds Bank Chambers, Fawcett St.

**Swale (Kent) R.D.C.** Erection of 20 houses at Boughton. Engineer and Surveyor, 48 Bell Rd, Sittingbourne.

**Washington (Dur) U.D.C.** Approval in principle given to layout plans for Coach Rd estate, providing for 569 houses in addition to schools, community centre, church, etc.

**West Bromwich.** Plans submitted for construction of new factory in Lyng Lane for Retsam Co., Ltd., of Newhall Hill, Birmingham.

**West Hartlepool.** S. Durham Steel and Iron Co., Ltd., considering extensions to the Longhill works.

**Weston-super-Mare.** Plans prepared for building comprising five shops on ground floor and offices above in High St. Architects are Morrison, Rose and Partners, Mayfair, London.

**Wigston.** Brevitt Shoe Manufacturers, Ltd., Northampton, are to build new factory off Blaby Rd.

**Worksop U.D.C.** Erection of 52 houses off Baulk Lane, Harworth. B. D. Thompson, Council's Architect, 83 Bridge St.

## Overseas

**British East Africa.** Anglo-Baltic Corporation, Ltd., P.O. Box 200, Nairobi, want to contact U.K. manufacturer of domestic refrigerators prepared to consider granting sole agency agreement in East Africa.

**New Zealand.** An Auckland company are to expand their activities to include handling agencies for U.K. manufacturers of electric motors, pumps, switchgear and cables. The firm is Watson, Steele and Gamley Ltd., P.O. Box 1887, Auckland, C.1.

# NEW COMPANIES

*Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.*

**"Gammatron" Nucleonics Ltd.** Manufacturers of and dealers in radio-isotope equipment, instruments and apparatus, designers and engineers of electronic and nucleonic appliances, etc. Nom. cap.: £100. Dirs.: Sir James Marshall-Cornwall (Development) Ltd., 9 Cavendish Sq., W.1. Primar Electronic and Technical Products, Ltd., Grand Bldgs., Trafalgar Sq., W.C.2.

**Ventura (Lighting) Ltd.** 43 Portland Rd, W.11. Manufacturers of and dealers in lamps, reflectors, etc. Nom. cap.: £5,000. Dirs.: Antoinette M. J. Boissevain, D. W. Boissevain and R. Boissevain.

**S.E.P. (Northern) Ltd.** Electrical appliance dealers and manufacturers, etc. Nom. cap.: £3,000. Dirs.: B. Bentwood and J. Billings. Subs.: L. Harris and N. Davis, 11 Albert Sq, Manchester.

**Dialex Ltd.** 35 Brompton Rd, S.W.3. Manufacturers of and dealers in sound recording and reproducing apparatus, etc. Nom. cap.: £1,000. Dirs.: G. Trevor-Johnstone and Joan W. Trevor-Johnstone.

**Hillside Electric (Finchley) Ltd.** 246 Ballards Lane, N. Finchley, N.12. Electrical equipment specialists, etc. Nom. cap.: £500. Dirs.: A. W. Marsh and Ruth M. B. Marsh.

**Walker Brothers (Pontnewydd) Ltd.** 9 Richmond Rd, Pontnewydd, Mon. Consulting wireless or radio experts, designers and manufacturers of wireless electrical apparatus, etc. Nom. cap.: £7,000. Dirs.: A. C. Walker and E. E. Walker.

**W.B.M. Installations Ltd.** 1b Bensham Manor Rd, Thornton Heath, Surrey. Electricians, radio and electrical engineers, etc. Nom. cap.: £500. Dirs.: W. F. Major and A. Baker.

**Ronden Manufacturing Co., Ltd.** 36 Boleyn Rd, N.16. Manufacturers of and dealers in electrical goods of all kinds, etc. Nom. cap.: £100. Dirs.: R. M. Tourick and D. D. Marks.

**Carlow Rentals Ltd.** 14 St. Mary's St, Bedford. Hirers out of electrical and mechanical apparatus and accessories, in particular wireless and television sets, etc. Nom. cap.: £100. Dirs.: P. H. Carlow and A. A. Jones.

**Carlow Manufacturing Co., Ltd.** 14 St. Mary's St, Bedford. Manufacturers of and dealers in, repairers and hirers out of electrical and mechanical apparatus, accessories and components of all kinds, in particular wireless and television sets, etc. Nom. cap.: £100. Dirs.: P. H. Carlow, A. A. Jones and G. D. Morton.

**Electric Whaling Ltd.** To buy, manufacture and sell equipment for killing fish and marine animals by means of electricity, etc. Nom. cap.: £100. Dirs.: H. C. Margrett, R. Marsden, H. S. Rogers, H. R. G. Stoney and Sir Archibald V. Board, D.S.O., M.C. Subs.: G. M. Lewis and S. A. Fenburgh, 62 London Wall, E.C.2.

**Harston Motors Ltd.** 10 Jesus Lane, Cambridge. Motor, aeronautical, electrical, mechanical and general engineers, etc. Nom. cap.: £10,000. Permt. dirs.: Mildred A. Wilson and C. B. Wilson.

# MEETINGS TO NOTE

**THURSDAY, 23 SEPT.**

WOMEN'S ENGRNG. SOC. "Current Aspects of TV." R. W. Addie, 35 Grosvenor Place, S.W.1. 7 p.m.

I.E.E. (E. Midland). "New Lamps—New Uses and New Lighting Techniques." R. V. Mills. Swan St Hall, Spalding, 6.30 p.m.

**FRIDAY, 24 SEPT.**

INCORP. PLANT ENGRS. (Birmingham). "Materials Handling in Saw Mills and its Problems." H. B. Marson. Imperial Hotel, 7.30 p.m.

INTERNATIONAL COMM. MOTOR TRANSPORT EXHIBN. at Earls Court, London. Continues until 2 Oct.

E.W.F. Dance in aid of E.I.B.A. at Londonderry Hse, Park Lane, W.1.

**MONDAY, 27 SEPT.**

A.S.E.E. (Bournemouth). "Electrical Control Gear for Mechanical Handling Plant." S. H. Harding. Grand Hotel, 8.15 p.m.

**WEDNESDAY, 29 SEPT.**

INCORP. PLANT ENGRS. (Glasgow). Ladies Night at Marlborough Hse, Langside Ave.

IDEAL HOME EXHIBN. at Bingley Hall, Birmingham. Closes on 23 Oct.

BRIT. INSTN. OF RADIO ENGRS. (London). "Computing Circuits in Flight Simulators." A. E. Cutler. School of Hygiene, Keppel St, W.C.1, 6.30 p.m.

WOMEN'S ENGINEERING SOC. (Manchester). "Health in Industry." Dr M. W. Robinson. Engrs. Club, Albert Sq, 6.45 p.m.

**THURSDAY, 30 SEPT.**

INCORP. PLANT ENGRS. (Sheffield). Brains Trust: Fuel Conservation. Grand Hotel, 7.30 p.m.

ENGINEERS GUILD. Sixth annual meeting at Caxton Hall, Westminster, 6 p.m.

**FRIDAY, 1 OCT.**

A.S.E.E. (Liverpool). "Off Peak Space Heating." C. J. Wheeler. Liverpool Engrng. Soc., 9 The Temple, 24 Dale St, 7.30 p.m.

A.S.E.E. (N.W. London). "Modern Electric Repair Shop Practice." E. H. Hymas. Century Hotel, Forty Ave, Wembley Park, 8.15 p.m.

ELECTRICAL TRADES' COMMERCIAL TRAVELLERS' ASSOC. Annual ball at Park Lane Hotel, Piccadilly, London, 7 p.m.

MANCHESTER ASSOC. OF ENGINEERS. Inaugural address.

INST. OF FUEL (S. Wales). "Preparation of Water for Use in Steam Boilers." W. F. Gerard. S. Wales Inst. of Engrs., Park Place, 6 p.m.

# TRADE NOTES

**Beama Contract Price Adjustment Formulæ.**—*For Electrical Machinery and Equipment.* For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at 18 Sept., 1954, shall be deemed to be 150s. 6d.; (*b*) "Cost of Material"—the index figure for materials used in the Electrical Machinery Industry published in the Board of Trade Journal on 18 Sept., 1954, is 159·4.

*For Turbo-Generating and Allied Plant.* For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at 18 Sept., 1954, shall be deemed at 150s. 6d. (*b*) "Cost of Material"—the index figures published in the Board of Trade Journal on 18 Sept., 1954, are: Materials used in Mechanical Engineering Industries—150·6, "Blast Furnaces and Iron and Steel Melting and Rolling (40 and 41)"—146·3. The price of brass condenser tubes, ¾ in. o/d 18 s.w.g. published in *The Metal Bulletin* on 17 Sept., is 3s. 7⅝d. per lb.

*For outstanding Contracts covered by the B.O.T. Intermediate Products Index.* For purposes of calculating variations in (*a*) "Rates of Pay"—the rate of pay for adult male labour at 18 Sept., 1954, shall be deemed to be 150s. 6d.; (*b*) "Cost of Material"—the index figure for Intermediate Products published in the Board of Trade Journal on 18 Sept., is 360·9.

**Manchester office.** Grey and Marten Ltd., City Lead Works, Southwark Bridge, S.E.1, have opened their Manchester office at 4, Station Bldgs, Altrincham, Cheshire (Telephone: Altrincham 5018). Office manager is Mr R. D. H. Hasted.

**Changes of address.** The Baldwin Electrical Co., (St. Marylebone) Ltd., has moved to 43 Dorset St, W.1. The telephone number remains Welbeck 1638. As from today, 23 Sept, the Electric Discharge Lamp Auxiliaries Council has moved to 68 Victoria St, S.W.1. The telephone No. remains, Victoria 0328.

**Distributors.** Chamberlain Industries Ltd. have appointed Drummond Asquith (Sales) Ltd., of King Edward Hse, New St, Birmingham, 2, as sole distributors in the United Kingdom of the production tube bending machinery which they design and manufacture in conjunction with Walter P. Hill Inc. of Detroit, U.S.A.

# THORN ELECTRICAL INDUSTRIES—A RECORD YEAR

THE eighteenth annual ordinary general meeting of Thorn Electrical Industries Ltd. was held on 17 Sept. in London, Mr Jules Thorn (Chairman and Managing Director) presided and in the course of his Speech said:

The results indicate satisfactory progress by the Group. The Trading Profit, at £1,054,348, has increased by £283,000 and the net profit before taxation, amounts to £778,306 exceeding the previous year's earnings by more than £230,000. Taxation, at £462,740 again absorbs more than 60% of the Net Profit.

The Reserves of the Group now stand at £1,118,812 and exceed the total issued capital.

Progress during the year in the Atlas Lighting Division has been remarkable and apart from the increased popularity of all Atlas products we have been fortunate in securing very substantial contracts from the Government, public bodies, municipal authorities and large industrial users. We can claim to have well maintained our leadership in the Fluorescent field.

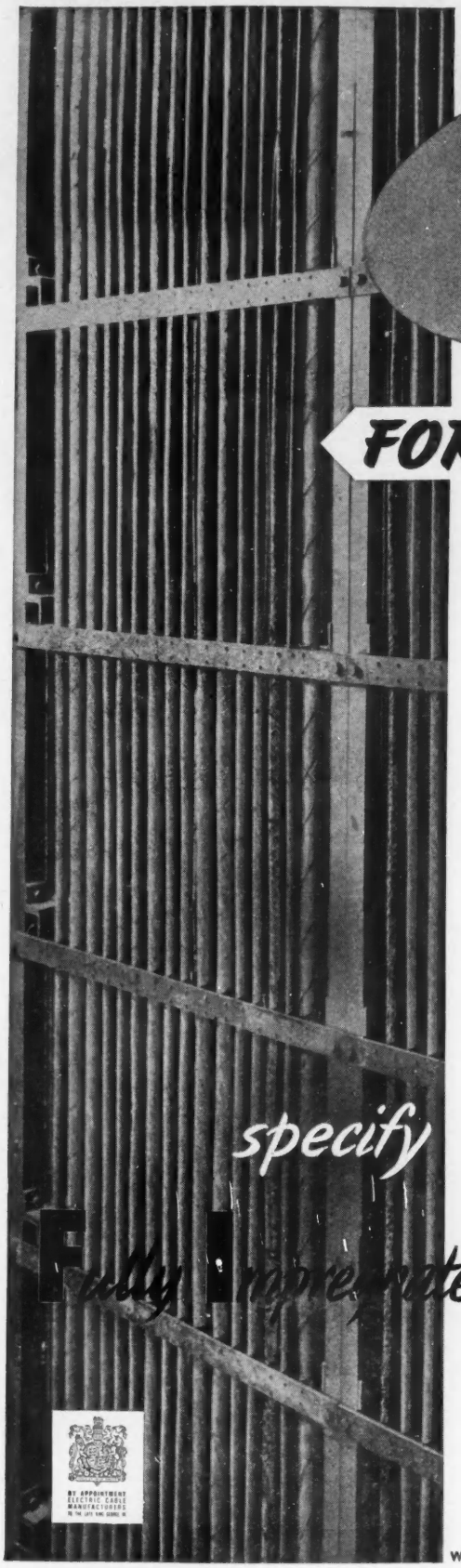
Our lighting subsidiaries have continued to make a valuable contribution to the prominent position which we hold in the lighting industry.

In the export field distribution of the company's products has continued to expand, particularly in Commonwealth and "Sterling" countries. Export sales have increased by approximately 40%.

Ferguson Radio and Television Division enjoyed another record year, the turnover reaching a new high level.

I have always resisted the temptation to make optimistic forecasts, but we are now beginning to reap the benefits of the large investments and the hard work which for some years have gone into our research, development and manufacturing resources.

The report was adopted and a dividend of 20% approved.



# HENLEY'S FIND the answer

## FOR VERTICAL RUNS

It is no longer necessary to specify drained cables for vertical situations at any voltage up to and including 11 kV. Henley Fully Impregnated Non-Draining cables having thicknesses of insulation strictly in accordance with B.S.480 at all voltages, provide a complete answer to this problem and have superior electrical properties to the drained type. They cost no more than standard cables, whether sheathed with lead or aluminium. For all cables manufactured to B.S.760 (for mines, quarries and metalliferous mines) Henley Fully Impregnated Non-Draining cables offer all the advantages of a fully impregnated insulation, but without risk of compound migration.

### SPECIAL COMPOUND

HENLEY Fully Impregnated Non-Draining Cables are impregnated with a special non-migratory compound developed in the Henley Research Laboratories.

### OPERATING TEMPERATURE

Henley Fully Impregnated Non-Draining Cables are completely non-draining at more than maximum working temperature.

### JOINTING AND ACCESSORIES

The normal Henley accessories and jointing techniques used for other paper cables are suitable for the Henley Fully Impregnated Non-Draining Cables.

*specify* **HENLEY**

***Fully Impregnated Non-Draining cables***

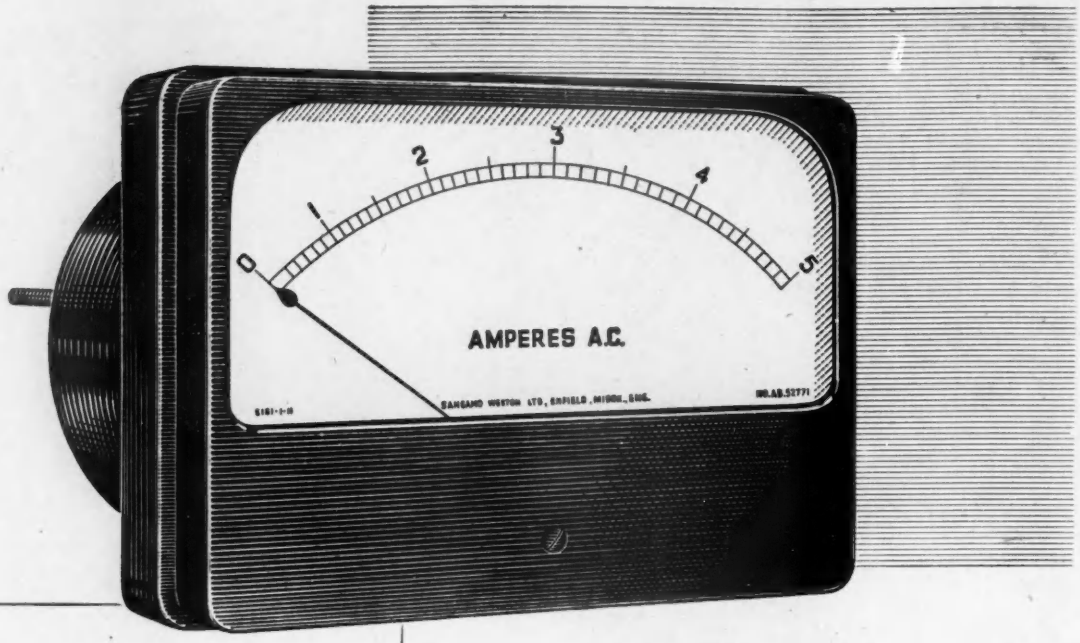
***– cannot bleed on vertical runs***

**Patent Applied For**

**No special accessories are needed. Available for standard voltages up to 11 kV in the normal range of finishes. For use in all normal situations and ideal for installation in factories, collieries, etc.**

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53, HATTON GARDEN, LONDON, E.C.1




**WESTON ELECTRICAL INSTRUMENTS INCLUDE:–**

**LABORATORY STANDARDS**

**SUB STANDARDS**

**FIRST GRADE PORTABLE INSTRUMENTS**

**ROUND, RECTANGULAR AND EDGEWISE SWITCHBOARD AND PANEL INSTRUMENTS**

**PORTABLE TEST SETS**

**RELAYS**

**AIRCRAFT INSTRUMENTS**

# THE WESTON RANGE OF RECTANGULAR INSTRUMENTS

These instruments, giving the advantage of long, easily read scales, are designed to harmonize with rectangular panels and are offered in a variety of types and scale ranges.

Supplied as D.C. moving coil, A.C. rectifier and H.F. thermocouple types; also A.C./D.C. moving iron types.

Four sizes are available with scale lengths of 2·5″, 3·2″, 4·2″ and 6·25″.

Front of panel or back of panel mounting may be adopted as desired and if the former method is used, there is complete interchangeability with existing round models.

The 3·2″ and 4·2″ scale instruments are available with either illuminated or non-illuminated dials; the 2·5″ and 6·25″ scale instruments being available only with non-illuminated dials.

# WESTON

## Measuring Instruments

**SANGAMO WESTON LIMITED**

**ENFIELD · MIDDLESEX**

**Tel: Enfield 3434 (6 lines) & 1242 (6 lines) Grams: Sanwest, Enfield**

Scottish Factory: Port Glasgow, Renfrewshire. Port Glasgow 41151

Branches: London, CHAncery 4971 · Glasgow, Central 6203 · Manchester, Central 7904 · Newcastle-on-Tyne, Newcastle 26867 · Leeds, Leeds 30867 · Liverpool, Central 0230 · Wolverhampton, Wolverhampton 21912 Nottingham, Nottingham 42403 · Bristol, Bristol 21781 · Southampton, Soton 2328 · Brighton, Brighton 28497

# CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

## TENDERS INVITED

AMENDED ADVERTISEMENT

**BOROUGH OF WEMBLEY**

CONVERSION OF STREET LIGHTING FROM GAS TO SODIUM VAPOUR DISCHARGE LIGHTING

TENDERS, which must be received not later than noon on 6 Oct., are invited for the above work which comprises the dismantling of Gas Lamps and the erection of 471 No. 45 or 60 W Sodium Vapour Discharge Lamps.

Form of Tender, Bill of Quantities and Specification may be obtained from the Borough Treasurer, Town Hall, Wembley, upon deposit of Two Guineas which will be refunded if a bona fide tender is submitted with all documents intact.

Conditions of Contract and drawings may be inspected at the office of the Borough Engineer and Surveyor. (N 192)

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**BOROUGH OF GRANTHAM**

ELECTRIC STREET LIGHTING

TENDERS are invited for the supply and erection of 668 concrete lighting columns and wall brackets together with lanterns and control gear.

Specification and bills of quantities may be obtained from the Borough Engineer and Surveyor, Guildhall, Grantham, on payment of a deposit of £2. 2s., which will be returned on receipt of a bona fide tender.

Tenders, in plain sealed envelopes endorsed "Tender for Street Lighting," should reach the undersigned not later than 10 a.m. on Tuesday, 12 Oct., 1954.

JOHN F. GUILE,
Town Clerk.

Guildhall,
Grantham. (N 129)

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**ESHER URBAN DISTRICT COUNCIL**

TO ELECTRICAL CONTRACTORS
Contract No. 180

TENDERS are invited for the repair and renewal of the internal electrical installation in the Council Offices (Main Block). The form of tender and specification may be obtained from the Engineer and Surveyor, Council Offices, Esher, on payment of a deposit of one guinea, which will be refunded in full on the return of the documents in good condition.

Tenders on the prescribed form enclosed in the envelope provided, and endorsed "Electrical Works—Main Council Offices," but bearing no mark indicating the sender, must be addressed to the undersigned and received by him not later than 5 p.m. on Monday, 11 Oct., 1954.

The Council do not bind themselves to accept the lowest or any tender.

FREDERICK EDWARDS,
Clerk of the Council.

Council Offices,
Esher, Surrey.
Sept. 1954. (N 180)

## APPOINTMENTS VACANT

*Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.*

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**BRITISH ELECTRICITY AUTHORITY**
**London Division**

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or C. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for post (*a*) and Corporate Membership for posts (*b*) an advantage.

(*b*) OPERATION AND EFFICIENCY ENGINEER
BANKSIDE GENERATING STATION
Vacancy No. 54/800

Sound technical and practical training necessary with considerable experience in operation of large H.P. Turbine and Boiler Plant. Will be responsible for the efficiency of plant and the control of personnel. Salary—Class H, Grade 5=£929. 5s. p.a.

(*b*) SHIFT CHARGE ENGINEER
BATTERSEA GENERATING STATION
Vacancy No. 54/801

Sound engineering training necessary followed by considerable experience in operation and maintenance of Modern High Pressure High Temperature, Power Station Plant. Salary—Class M, Grade 7=£1,035. 6s. p.a.

(*b*) SECOND ASSISTANT ENGINEER
GROUP IV HEADQUARTERS
Vacancy No. 54/802

Applicants should be familiar with operational requirements of modern Generating Stations. Knowledge of salary and wage agreements for Electricity Industry an additional qualification. Appointment offers opportunity for experience in executive and administrative functions, and duties will include analysis of returns and programmes, and investigation of engineering problems. Successful candidate will be required to assist the Group Generation Engineer (O) in matters relating to control of a large group of Stations. Applicants for the previous advertisement (Vacancy No. 54/647) will be considered and need not re-apply. Salary—Class AX/EX, Grade 2, £875. 14s./£1,018. 10s. rising ultimately to £1,133 p.a.

(*a*) GENERAL ASSISTANT ENGINEERS
(EFFICIENCY AND TESTING)
DIVISIONAL AND GROUP I HEADQUARTERS
Vacancy No. 54/803

Good technical education necessary with experience of the testing and/or operation of the mechanical plant in power station. Salary—Class AX/EX, Grade 8=£526. 1s./£749. 14s. p.a.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, British Electricity Authority, London Division, P.O. Box No. 136 Generation House, Great Portland St. W.1, and be received within 14 days of this advertisement. (N 206)

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**ELECTRICAL ENGINEERS**

required by the CENTRAL ELECTRICITY BOARD, MALAYA. Salary scale (including expatriation pay and present temporary allowance at rate for single men) equivalent to £1,197 rising to £2,100 a year. Commencing salary according to qualifications and experience. Additional temporary allowances totalling £210/£399 a year (married men) and £301/£630 (family men). Option of appointment either (*a*) on agreement for three years with prospect of permanency or (*b*) on contract for three years with gratuity of £200 or £280 for each year's service according to salary. Opportunity of terminating appointment after one year's service. Free passages. Liberal leave on full salary.

(A) MECHANICAL ENGINEER (M2C/30065/EE)

Candidates must have served an apprenticeship with a firm of diesel engine manufacturers and have had not less than five years' experience on erection and/or maintenance of engines and power plant. They should have a knowledge of A/C electrical generators of types normally driven by diesel prime movers. Preference will be given to candidates possessing a 1st class M.O.T. Diesel Certificate.

(B) ELECTRICAL ENGINEER (DISTRIBUTION)
(M2C/40440/EE)

Candidates must have had sound training in both electrical and mechanical engineering with experience in the operation of medium Electricity Supply Undertakings and possess a competent knowledge of the maintenance of high and low tension overhead and underground A.C. distribution systems and substation plant. They should preferably be Corporate Members or Graduates of the Institute of Electrical Engineers or possess degrees or other qualifications carrying exemption from the Institute's Graduate examination. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote reference number stated against post applied for. (N 172)

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**THE BRITISH IRON AND STEEL RESEARCH ASSOCIATION**

GRADUATE required by the above Association for work concerned with experimentation and re-design of control points in steelworks to fit the human operator. An interest in this type of research work is essential. Some knowledge of electrical engineering is desirable. Age 22-25. Starting salary according to age, qualifications and experience in the range £525/£650 p.a. Post is superannuated under the F.S.S.U. Location of work London. Written applications only quoting "Control" to Personnel Officer, B.I.S.R.A. 11 Park Lane, W.1. (N 184)

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**BRITISH ELECTRICITY AUTHORITY**
**Yorkshire Division**

require a GENERAL ASSISTANT ENGINEER (Civil) in the Generation Construction Department, Sheffield. Applicants should preferably be University Graduates or persons with equivalent qualifications and have some experience of Civil Engineering and/or Building Work. Duties will be to assist in the design and construction of power stations, including the preparation of drawings and specifications and the examination of tenders.

Conditions of service and commencing salary in accordance with the National Joint Board Agreement, Class AX/EX, Grade 8, i.e. within the range £501/£639 per annum, according to experience and qualifications, rising to an ultimate maximum of £714 per annum.

Application forms obtainable from the Divisional Secretary (Establishments), British Electricity House, St. Mary's Rd, Leeds 7, to, whom completed forms should be returned within 10 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
(N 208)

## BRITISH ELECTRICITY AUTHORITY
### East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

SHIFT CONTROL ENGINEER
AVON POWER STATION, WARWICK
Vacancy No. 144/54/ET

Applicants should have had some experience in Power Station Control and have O.N.C. in Electricity.

Salary will be in accordance with Class E, Grade 10 (£555/£569 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 5 Oct., 1954.

SENIOR DRAUGHTSMAN (CIVIL)
CONSTRUCTION DEPARTMENT
Vacancy No. 112/54/ET

Candidates should have experience in the preparation of detail drawings and in the design of one or more of the following subjects:

Reinforced concrete structures.
Piled and slab foundations for heavy components.
Cable subways, Bridges and Culverts.

The salary will be in accordance with Grade 4 (£671/£780 per annum) or Grade 5 (£567/£671 per annum) of Schedule D of the National Joint Board Agreement.

Closing date for receipt of applications, 5 Oct., 1954.

ASSISTANT SHIFT CHARGE ENGINEER
FREEMEN'S MEADOW POWER STATION, LEICESTER
Vacancy No. 143/54/ET

Applicants should have had experience in the operation of a large pulverised fuel fired Station. The principal duties will be in the Boiler House. Technical qualifications up to H.N.C. are desirable.

The salary will be in accordance with Class H, Grade 9 (£680/£706 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 5 Oct., 1954.

SHIFT CHARGE ENGINEER
AVON POWER STATION, WARWICK
Vacancy No. 148/54/ET

Applications are invited from qualified Engineers for the position of Shift Charge Engineer at Warwick Power Station.

Applicants should have had experience in the operation of Steam Turbines and Boiler Plant.

Salary in accordance with Class E, Grade 7 (£649/£681 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 11 Oct., 1954.

These appointments will be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form A.E.6/ACT which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.
17.9.54. (N 216)

## SOUTHERN ELECTRICITY BOARD

ASSISTANT ENGINEER
(MAINTENANCE AND OPERATION)

GREENFORD District of No. 1 (Southall) Sub-Area. Salary N.J.B. Class F, Grade 7 (£731. 17s. per annum including London Weighting) N.J.B. Conditions of Service.

The duties of the post will be the maintenance and operation of switchgear, transformers and cables up to and including 11 kV. The appointment will involve standby duties.

The successful candidate will be required to contribute to the B.E.A. and Area Boards' Superanuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 2/6 Windmill Lane, Southall, Middlesex, and returned to him in envelopes suitably endorsed, not later than 8 Oct., 1954. (N 218)

## SOUTH WEST SCOTLAND ELECTRICITY BOARD
### Glasgow Sub-Area

APPLICATIONS are invited for the position of:

DISTRICT ENGINEER—WESTERN DISTRICT

Applicants should have a sound engineering training and subsequent experience with Underground H.V. and L.V. Distribution systems, including the maintenance and operation of H.V. and L.V. switchgear, fault location on H.V. and L.V. cables and testing and protection gear. Corporate Membership of the Institution of Electrical Engineers or equivalent qualification would be an advantage.

Salary Scale—£912/£951 per annum, Class F, Grade 3, National Joint Board Agreement.

The appointment will be superannuable under the British Electricity Authority and Area Boards Superannuation Scheme.

The successful candidate will require to reside within reasonable distance of District Headquarters.

Application should be made on form to be obtained from the undersigned and should be completed and returned to me not later than Saturday, 9 Oct., 1954.

A. KELSO,
75 Waterloo St, Manager.
Glasgow C.2. (N 183)

## THE ELECTRICITY CORPORATION OF NIGERIA

has the following vacancies on its staff for service in Nigeria.

1. POWER STATION METER AND INSTRUMENT MAINTENANCE ENGINEER

Candidates preferably holding the H.N.C. should not be more than 45 years of age and have had several years' experience in the care, maintenance, overhaul and calibration of power station meters and instruments such as pressure gauges, steam and water flow meters and $CO_2$ recorders, etc., and should be capable of taking complete responsibility for the efficient performance of such instruments in 14 power stations throughout Nigeria. Salary in the range of £830/£950 per annum.

2. SWITCHGEAR ERECTORS

Candidates should be not more than 45 years of age and have had several years' experience in the erection of H.T. metalclad switchgear up to 11 kV. Drawing Office experience and a knowledge of secondary wiring would be an advantage. They should be capable of working on their own initiative and of taking charge of African fitters and labourers. Salary in the range of £830/£950 per annum.

3. INSPECTOR OF WORKS
(Building and Civil Engineering)

Candidates should be capable of estimating and supervising work of both contract and direct labour. They should have a general all-round practical experience in building work and reinforced concrete and must be able to organise and control jobs under Contract or Direct Labour and with a minimum of Headquarters direction. Age not more than 45. Salary in the range £830/£950 per annum.

4. ASSISTANT TO COMMERCIAL MANAGER

Candidates should have had good experience in the commercial branch of an Electricity Supply Undertaking, including a knowledge of tariffs and the formulation of hire, hire-purchase and other sales or development schemes. A knowledge of purchasing procedure is essential and the possession of a recognised Electrical Engineering qualification or a Diploma of the Electrical Development Association is desirable. Preferably between 25 and 35 years of age. Commencing salary in the scale of £800/£1,000 per annum.

5. ASSISTANT SURVEYOR

Candidates should have good practical survey experience in the field and a sound knowledge of tachemetry, precise levelling, theodolite and Chain Surveying, adjustments to instruments and plotting and reporting. This post is for one tour of 18/24 months and candidates should preferably be between the ages of 25 and 35. Salary in the range of £760/£800.

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All salaries carry a generous expatriation allowance. Vacancies 1 and 4 are on a permanent and pensionable basis or on contract terms if preferred. Vacancies 2, 3 and 5 are on contract terms for one or two tours. They carry an increase in basic salary of 10%, and a gratuity of £37. 10s. for every 3 months' service is payable on the conclusion of the Contract. Free passages are provided for man and wife, with assisted passages or U.K. maintenance allowance for 2 children up to 18 years of age. Free furnished quarters, low income tax, home leave on full pay. Forms of application can be obtained from the Liaison Officer, 11 Manchester Sq, London, W.1. (N 215)

## TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

APPLICATIONS are invited to fill the post of POWER STATION CHEMIST —Port of Spain:

Candidates must possess a B.SC. degree obtained at a recognised university or be an Associate of the Institute of Chemistry. The duties of this post consist mainly of the sampling and analyses of fuels, oils and waters, the control of boiler fuel water and cooling water treatment, and the analyses of deposits, etc., and all other chemical investigations as the Commission may require. Knowledge and experience of the chemical control of power station plant and materials, and of the allied aspects of metallurgy are essential. Experience of combustion efficiency would be an additional advantage. The yearly salary is £1,100, rising by increments of £27. 10s. to £1,182. 10s. These salaries apply until the total units sold reach 100 MW hours. The salary range will then be £1,210 to £1,292. 10s. To these salaries a temporary Cost of Living allowance of £25 a year is also added. A house allowance based on salary received, but not to exceed £10. 8s. 4d. per month, if married, and £6. 5s. per month if single, is also payable and an outfit allowance of £60 will be granted on arrival. The successful candidate will be required to pass a medical examination and will be provided with First Class passages for himself, his wife and two children up to the age of 18, on appointment. Leave passages to the U.K. or equivalent will be provided every three years. Vacation, casual and sick leave on full pay. General details of Trinidad's climate, income tax, etc., can be obtained from the West India Committee at 40 Norfolk St, London, W.C.2.

Applications giving full details of qualifications, experience and personal particulars, together with two recent references, should be sent by air mail to reach the Acting General Manager, Trinidad and Tobago Electricity Commission, P.O. Box 121, Port of Spain, Trinidad, B.W.I., on or before Monday 1 Nov., 1954.
9 Sept., 1954. (N 176)

## MIDLANDS ELECTRICITY BOARD
### Wolverhampton and District Sub-Area

SUB-AREA ENGINEER

APPLICATIONS are invited for appointment to the above post as from 1 Jan., 1955.

Applicants, who should have extensive experience in the design, construction, operation and maintenance of large distribution systems, will be responsible to the Sub-Area Manager for all engineering matters in the Sub-Area.

Applicants should have received a thorough technical training and have good executive experience in a responsible post. Preference will be given to those holding appropriate qualifications including Corporate Membership of the Institution of Electrical Engineers.

The commencing salary will be £1,600 per annum (N.J.M. Scale 4, £1,600/£1,750 per annum), Superannuable.

Applications, stating age, experience, qualifications and present salary should be forwarded within 7 days to Mr F. J. Elliott, Manager, Wolverhampton and District Sub-Area, Midlands Electricity Board, 83 Darlington St, Wolverhampton. A. Stephens, Secretary. (N 214)

### UNIVERSITY OF WESTERN AUSTRALIA

APPLICATIONS are invited for the position of LECTURER IN ELECTRICAL ENGINEERING.

Applicants should hold a degree in Engineering and preference will be given to an applicant with experience or interest in some aspects of heavy power electrical engineering such as modern methods of system analysis or some aspect of electrical design.

The salary range, which is under review at present, is £859/£50/£1,259 (Australian) per annum, which includes a present cost of living allowance of £259. According to qualifications and experience an appointment may be made within the range.

An allowance is made towards travelling expenses.

The successful applicant will be expected to commence duties as early as possible in 1955.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 5 Gordon Square, London, W.C.1.

The closing date for the receipt of applications, in Australia and London, is 30 Oct., 1954. (N 209)

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### YORKSHIRE ELECTRICITY BOARD

#### No. 3 (Sheffield) Sub-Area

SENIOR ASSISTANT
(BILLING AND RENTALS)

APPLICANTS should have had a sound education and training in accountancy and possession of a recognised accountancy qualification will be an advantage.

Applicants should be capable of organising and controlling efficiently a large staff responsible for the billing of electricity accounts together with the maintenance of debtors control accounts and the production of statistical information relating to the sales of electricity, etc. Some knowledge of mechanised accounting systems is also required.

Salary—N.J.C. Grade 6, £730/£25/£805 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St, Sheffield, not later than Thursday, 7 Oct., 1954.

#### No. 6 (Hull) Sub-Area

Bridlington District
THIRD ASSISTANT DISTRICT ENGINEER
(COMMERCIAL)

Applicants should have had a sound practical training in electrical installation work, and have an up-to-date knowledge of the utilisation of electrical appliances on farms. The successful applicant will be required to negotiate with consumers requiring electricity supplies, particularly in rural areas, and deal with estimates for installations, tariffs and sales development generally.

Candidates should be in possession of the Higher National Certificate in Electrical Engineering, or similar qualification.

The successful applicant will be required to reside in the district.

Salary—N.J.B. Class D, Grade 9, £561/£578 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than Thursday, 7 Oct., 1954.

#### No. 2 (Huddersfield) Sub-Area

Halifax District
DEMONSTRATOR

Applicants must have had 2 years' training in Domestic Science at a recognised College and have obtained the E.A.W. Certificate. Previous extensive experience of demonstrating is essential.

Salary—N.J.C. Grade 1, £400/£490 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be for-

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warded to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market St, Huddersfield, not later than Thursday, 7 Oct., 1954.

#### No. 3 (Sheffield) Sub-Area

CHARGEHAND ELECTRICIAN (TELEPHONE)

Applicants should have a knowledge of the workings of automatic and manual telephone exchanges and should have had practical experience in the maintenance of such systems. Experience in the installation of telephones, running of cables, testing, fault location and ability to drive is essential. A knowledge and experience of V.H.F. radio communication equipment will be an advantage.

The conditions of service are in accordance with the N.J.I.C. Agreement.

Rate of Pay—3s. 11d. per hour.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St, Sheffield, not later than Thursday, 7 Oct., 1954. (N 217)

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### CORPORATION OF LIVERPOOL

MAINTENANCE CRAFTSMEN required for City Lighting Department (Mersey Tunnel Section), Liverpool Corporation, as follows:

(*a*) MAINTENANCE FITTER required for servicing heavy duty fans, gear boxes and pumps. Must be used to handling large ball, roller and sleeve bearings up to 10 in. in diameter: (*b*) INSTRUMENT MAINTENANCE MECHANIC required for repair and servicing of Cambridge, Kent and Electroflo instruments operating on air, gas and water within fine limits. Rate of pay in each case is 3s. 9d. an hour for 44-hour week, and conditions of service are those of the N.J.I.C. for the Electricity Supply Industry; (*c*) TELEPHONE MAINTENANCE ELECTRICIAN required for repair and servicing of manual and automatic exchanges, traffic signals and fire alarms. Cable repair and fault finding will be an advantage. Rate of pay is 3s. 10½d. an hour for a 44-hour week and conditions of service are in accordance with the J.N.C. for Local Authorities Services (Engineering Craftsmen). Occasional night work will be necessary in all three appointments. Applications giving full details of age, training and experience should be addressed to the City Lighting Engineer, 17 Highfield St, Liverpool 3. (JA 3675.) (N 181)

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### BRITISH ELECTRICITY AUTHORITY
#### South-Eastern Division

ASSISTANT ENGINEER (Mechanical Inspecting) Croydon "B" Power Station. Successful applicant will be responsible for the inspection of mechanical plant during maintenance, assessing extent of work and preparation of reports on defective plant and maintenance of records. N.J.B. Conditions of Service Class J, Grade 11, £670. 19s. p.a. including London Allowance. Applications giving details of education, present position, experience, etc., should be received by the Station Superintendent, Croydon "B" Power Station, Beddington Farm Rd, Croydon, Surrey, not later than 4 Oct. (N 226)

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### MIDLANDS ELECTRICITY BOARD

JUNIOR ENGINEER required in the Sub-Area Meter Department of the Central Gloucestershire Sub-Area, located at Cheltenham. Duties will include laboratory work, sub-standard instrument calibration, the testing of polyphase metering equipment both in the Test Room and on consumers' premises, and the carrying out of special tests on other apparatus including switchgear and relays. Technical qualifications desirable. Salary £424 per annum (N.J.B. Grade H.16).

Apply in writing to Mr D. Holt, Manager, Central Gloucestershire Sub-Area, Midlands Electricity Board, 126 London Rd, Gloucester. A. Stephens, Secretary. (N 213)

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### BRITISH ELECTRICITY AUTHORITY
#### Eastern Division

APPLICATIONS are invited for the following posts.

SENIOR DRAUGHTSMEN—GENERATION CONSTRUCTION DEPARTMENT (MECHANICAL) AT DIVISIONAL HEADQUARTERS

Salary Schedule D, Grade 4, £704/£819 per annum.

The commencing salary (which includes London Weighting) will depend upon experience and qualifications. Applicants should preferably have experience in Generating Station plant layout and design of pipework, coal, ash and dust handling systems, etc.

STATION SHIFT CONTROL ENGINEER—IPSWICH GENERATING STATION

Salary Class D, Grade 10, £531/£547 per annum.

Applicants should have reached the standard of O.N.C. in Electrical Engineering or its equivalent, have experience in the operation of a Switchboard at a Generating Station and be fully conversant with High Voltage Switching operations and protective systems.

JUNIOR ENGINEER
CLIFF QUAY GENERATING STATION

Salary Class K, Grade 19, £402 p.a.—Grade 15, £545 p.a.

Commencing salary depending upon qualifications and experience.

The duties of the successful applicant will include assisting in the Control Room on shift and other operation and investigation duties. Preference will be given to applicants who have had previous experience in a Generating Station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

Applications stating age, qualifications and experience should be sent to the Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by 2 Oct., 1954.

W. N. C. CLINCH,
Controller.
(N 182)

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### SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER—Medway District.

Salary £577 p.a. under N.J.B. Schedule, Class F, Grade 10. Superannuable. Applicants should have had experience in the construction, operation and maintenance of three-phase and single-phase E.H.T. and L.T. overhead and underground systems, together with indoor and outdoor type substations and should hold the Higher National Certificate, or its equivalent in electrical engineering. The position will entail standby duty.

Applications, naming 2 referees, to Ramsden Mellor, M.I.E.E., A.I.MECH.E., Medway Manager, SEEBoard, Gardiner St, Gillingham, Kent, by 6 Oct., 1954.

A. L. BURNELL,
Secretary.
(N 210)

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### BRITISH ELECTRICITY AUTHORITY
#### Midlands Division

THIRD ASSISTANT ENGINEER (Site) is required in the Mechanical Engineering Section of the Construction Department at Walsall Power Station, and on its completion at another power station in the Midlands Division. N.J.B. service conditions, superannuable appointment, salary within Schedule "C,". Grade 5 of the Agreement, commencing in range £649/£790, ultimately rising to £858 per annum.

Applicants should have received a sound technical education with practical training, and previous constructional experience in the erection of boilers, turbines and ancillary plant; appropriate technical qualifications an advantage.

Apply, quoting Vacancy No. 764MD, on form AE6, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 9 Oct., 1954. (N 212)

**Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2.**

**BRITISH ELECTRICITY AUTHORITY**
**South Wales Division**

Vacancy No. 95/54

APPLICATIONS invited for superannuable N.J.B. appointment of FIRST ASSISTANT STATION CHEMIST, Newport Power Station. Salary F.9, £607/£629 per annum.

Degree in Chemistry or equivalent and experience in water treatment, coal and oil testing and corrosion problems desirable.

Application forms obtainable from Secretary, South Wales Division, British Electricity Authority, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 8 Oct., 1954. (N 204)

**BRITISH ELECTRICITY AUTHORITY**
**Midlands Division**

A GENERAL ASSISTANT ENGINEER is required in the Telecommunications Section of the Technical Department. N.J.B. Service conditions, superannuable appointment, salary within Schedule C, Grade 8, commencing in range £501/£639, ultimately rising to £694 per annum.

The minimum technical qualification required is the Higher National Certificate in Electrical Engineering, or equivalent. Preference will be given to candidates who have had experience with telecommunication equipment.

Apply, quoting Vacancy No. 771MD, on form AE6, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 9 Oct., 1954. (N 211)

AGENTS required by well-known Domestic Appliance Manufacturers to cover all areas of the British Isles. Wide experience of the Wholesale trade, Electricity Boards and Local Authorities essential. Remuneration by Nominal Retainer and Commission. Must be car owner. Position offers vast scope to successful applicants. Present Staff notified.—Box No. 3843, Electrical Times. (N 201)

ALKALINE BATTERIES LTD., of Redditch, are the largest makers in the Empire of Alkaline accumulators, miners' lamps and emergency lighting systems, which are in rapidly growing use particularly for export. The company has vacancies in its Technical Sales and Development Sections for Graduate ELECTRICAL ENGINEERS, not over 30 years of age, or for men nearing the end of their Degree Course who have completed National Service. The posts are pensionable and offer the prospect of executive rank. Applications with full educational details and experience should be addressed to Commercial Manager, Alkaline Batteries Ltd., Union St, Redditch. (N 1)

AN opportunity occurs in progressive manufacturing concern in London area for ENGINEER aged 25/35 with electrical or physicist degree, on development and research work on high frequency telecommunication cable and associated testing equipment. Salary will be commensurate with qualifications and experience. Apply giving full particulars to—Box No. 3811, Electrical Times. (N 64)

APPLICATIONS are invited from ENGINEERS with experience in the cable industry for vacancies in the sales organisation of a large, old established London cable making company. The duties will involve a large amount of travelling and possibly tours abroad from time to time. Candidates should state their age, details of their education, experience and salary required. All applications will be treated with strict confidence.—Box 3857, Electrical Times. (N 229)

ASSISTANT ELECTRICAL ENGINEER required in Consulting Engineer's Office. University Graduate with works experience, age 25/30, to design and supervise on site contract work for power equipment and installations. Five-day week. Superannuation Scheme. Apply stating age, qualifications and salary required to R. W. Gregory and Partners, Pilgrim House, Newcastle upon Tyne 1. (N 227)

BRITISH ELECTRICITY AUTHORITY, South West Scotland Division, requires an ASSISTANT ENGINEER (Instruments) at Braehead Power Station, Renfrew. Salary £641/£667. Experience in the maintenance, testing and calibration of instruments and automatic electric gear in Power Stations essential. Application forms from the Divisional Secretary, 168 Broomhill Drive, Glasgow, W.1, to be returned before 4 Oct., 1954. (N 219)

BRITISH ELECTRICITY AUTHORITY, Headquarters, Bankside, London, have vacancies for:

SENIOR CIVIL ENGINEERING DRAUGHTSMEN (Grade 5).

CIVIL ENGINEERING DRAUGHTSMEN (Grade 6).

Starting salaries, according to qualifications and experience:

Grade 5—£595/£705 inclusive.

Grade 6—£458/£595 inclusive.

Pension Scheme: one Saturday morning in 4 on duty. Application forms from D. Moffat, Director of Establishments, Winsley St, London, W.1. Quote Ref. ET/522. (N 173)

BRITISH ELECTRICITY AUTHORITY, Combustion and Fuel Technology Sub-Branch, Headquarters, London, requires a SCIENTIST to act as junior assistant to the Scientific Adviser on problems concerned with combustion in boilers and atmospheric pollution. The duties will not include Laboratory work but will be mainly analysis and reporting of information and after suitable training, microscopy. Candidates should be qualified Chemists with a University Degree or Corporate Members of the Institution of Chemical Engineers or the Royal Institute of Chemistry. Experience of power station practice will be an advantage, but is not essential. Salary N.J.B. (General Assistant Engineer), Grade 5. £558—£769 inclusive. Applications stating age, present position and salary and giving full details of training, qualifications and experience to D. Moffat, Director of Establishments, Winsley St, London, W.1, by 8 Oct, 1954. Quote Ref, ET/525. (N 207)

CONSULTING Engineers require ELECTRICAL DESIGNER DRAUGHTSMAN, age twenty-four to thirty-five, experienced in all classes of lighting and power installations for hospitals, schools, industrial projects, preparation of contract and specifications, etc., good draughtsmanship essential. Reply to A. F. Myers and Partners, 147 Victoria St, London, S.W.1. (N 107)

DESIGNER required for Fractional H.P. Motor for special applications. Payment according to efficiency results. We are able to do all necessary trial models and testing. Only designers able to prove ability should apply to Box No. 3853, Electrical Times. (N 224)

DRAUGHTSMAN, ELECTRICAL, with experience of A.C. and D.C. automatic Motor Control Gear. Altrincham district. State qualifications and salary required.—Box No. 3831, Electrical Times. (N 174)

ELECTRIC Cable Manufacturers require an ASSISTANT in their Testing and Quality Control Dept. Knowledge of both rubber and plastic technology is absolutely essential. Permanent pensionable position, apply in writing giving full details of experience, salary, age, etc., to the Secretary, British Driver-Harris Co., Ltd., Gaythorn Mill, Albion St, Manchester 15. (N 220)

ELECTRICAL ENGINEER required in Peterborough area. Applicants should have a good education of at least Higher National Certificate level. Capable of designing conventional multi-motor control panels for machine tools in prototype stage. Knowledge of electronic control an advantage but not essential. Responsible for electrical installation and Plant maintenance. Commencing salary £875 p.a. Apply giving full details to Box No. 3835, Electrical Times. (N 188)

A progressive MIDDLE EAST State invite applications for the following additional European personnel on their permanent staff.

ONE—FULLY QUALIFIED TRANSMISSION AND DISTRIBUTION ENGINEER. Applicants must possess technical and practical qualifications to H.N.C. (Corporate Membership of the Institution of Electrical Engineers an advantage) with training and subsequent experience fitting them to take charge of and maintain substations and expanding Mains Distribution network up to 33 kV in townships and rural districts. Age limit 38.

TWO—ASSISTANT TRANSMISSION AND DISTRIBUTION ENGINEERS. Qualified to H.N.C. or graduate Institution of Electrical Engineers, with experience in operation and maintenance of 33 kV transmission lines, cables and standard L.T. distribution systems. Experience in cable jointing up to 11 kV an advantage. Age limit 35.

ONE—POWER STATION SUPERINTENDENT. Applicants must be fully qualified mechanical engineers able to take charge of power station operation and maintenance. First class qualifications in steam boiler/turbine generator operation necessary, experience with diesel/gas engine generators and gas-fired/steam boilers desirable. Age limit 38.

FOUR—SHIFT ENGINEERS. Applicants must hold H.N.C. or equivalent qualifications, with experience in the operation of diesel/gas engine generators and associated auxiliaries. Experience of control-room operation and steam/turbine generators would be an advantage. Age limit 32.

These appointments carry attractive salaries and conditions and generous home leave. There is also a provident fund. Applications stating age and details of experience should be forwarded to Box No. 3847, Electrical Times. (N 203p)

ELECTRIC Cable Manufacturers require an ASSISTANT FOREMAN for their Extruding Dept. Knowledge of both rubber and plastic technology is absolutely essential. Permanent pensionable position, apply in writing giving full details of experience, salary, age, etc., to the Secretary, British Driver-Harris Co., Ltd., Gaythorn Mill, Albion St, Manchester 15. (N 221)

ELECTRICAL ENGINEER wanted. McLellan and Partners, Consulting Engineers, have a vacancy on planning and supervision of cabling and plant installation in a large works in South Wales. Salary £650/£900, depending on experience. Write to 32 Victoria St, London, S.W.1, giving age, education, qualifications and details of experience. (N 228)

ELECTRICAL FOREMAN required for maintenance of high voltage switchgear, motors, cables, control gear, etc. Commencing salary £505 per annum (range £505/£20/£665). Contributory pension scheme. Apply in writing, stating age and experience to Chief Engineer, The Colne Valley Water Company, Aldenham Rd, Watford, Herts. (N 157)

**CHINA ENGINEERS LTD.**
SINGAPORE

CONTRACT DEPARTMENT ENGINEER for Singapore required with good experience in electrical work, and with strong emphasis on cable and switchgear installation supervision. Good terms and employment conditions are offered.

Applications in writing to China Engineers Ltd., 36 Jermyn St, London, S.W.1. Suitable candidates will be interviewed in London. (N 197p)

**JOHNSON AND PHILLIPS LTD.**

require the services of a SENIOR CABLE ENGINEER in the Test and Research Department. The position involves responsibility to the Research Manager for the supervision of all research and development work on all types of power cables. A good all-round experience of the manufacture, design and installation of power cables for all voltages is essential. Experience of gas pressure and oil-filled cables is also required. Experience in the design of cable accessories would be an added advantage.

The position will carry a good salary and good prospects.

Full details of training, qualifications and experience to date should be given. Apply Employment Manager, Victoria Way, Charlton, S.E.7. (N 196p)

ELECTRICAL MACHINE DESIGNER: A. Reyrolle and Company Ltd, have a vacancy in their Rotary Equipment Department for an Engineer to assist in the design and development of A.C. generators and motors, including commutator motors. Applicants should have had training and experience in this class of work and should possess at least the Higher National Certificate in Electrical Engineering. Preference will be given to Corporate Members of the Institution of Electrical Engineers. Please apply with full particulars to the Chief Engineer, A. Reyrolle and Company, Ltd., Hebburn, Co. Durham. (N 193)

JOHNSON AND PHILLIPS LTD., have vacancies in their Transformer Department for TRANSFORMER DRAUGHTSMEN having experience in all sizes up to 1,000 kVA. In addition vacancies exist for men having experience in sizes 1,000 kVA to 30,000 kVA and the higher voltages.

Applicants should state age, training and experience, together with salary required, to Employment Manager, Johnson and Phillips Ltd., Victoria Works, Charlton, S.E.7. (N 38)

KEEN YOUNG SALES ENGINEER required as Midlands Representative by manufacturers of all forms industrial MV switchboards, cubicles, control panels, substation switchboards, feeder pillars, etc., with full range heavy duty combination fused switches to 800 amps and full industrial and domestic range of fusegear. Give details of experience in confidence to Managing Director, Dennis Switchgear, Fleming Rd, Speke, Liverpool. (N 139)

LEADING OIL COMPANY requires one ELECTRICAL ENGINEERING DRAUGHTSMAN for work in the Middle East. Age 25-30 years. Candidate should possess the Ordinary National Certificate in Electrical Engineering or have equivalent qualifications. An engineering apprenticeship is required which includes 3 years' practical experience in the shops followed by 3-5 years in the Drawing Office on electrical installations for Process Plants. Workshops and/or Factories. Overseas allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements. Pension Scheme. Write, stating age and full details of qualifications, quoting F.500 to Box 1239, c/o 191 Gresham House, E.C.2. (N 185)

**Assistant Electrical Engineer**

required by London Consulting Engineers for preparation of drawings and specifications for electrical installations in all types of buildings. Write giving full details of experience, age and salary required to—Box ET 586, LPE, 55 St. Martin's Lane, W.C.2. (N 122p)

MAINS ENGINEER required to take charge of the Mains and Substations in a rapidly expanding township in the Middle East. Duties would include planning, construction and maintenance of H.V. and L.V. Systems, comprising Underground Cables and Overhead Lines.

Candidates should be between 30 and 40 years and should have the degree of B.SC. or equivalent and be Corporate Members of the Institution of Electrical Engineers and should have had at least 10 years' experience with senior responsibility in a similar position.

Commencing salary would be £2,500 p.a. plus other emoluments.

All Applicants would require to undergo a medical examination.

Reply giving full details to Box No. 3845, Electrical Times. (N 202)

MINISTRY OF LABOUR AND NATIONAL SERVICE requires an ELECTRICAL ENGINEER for unestablished post at the Technical and Scientific Register. Candidates (minimum age 25) should hold degree or diploma in Electrical Engineering and/or equivalent professional qualification, with varied experience of light electrical engineering preferably including electronics. Duties: assistance in placing work of Register, involving interviews, advice on careers and correspondence. Salary within scale £495 (at age 25) to £745. Application forms from M. L. and N. S., Technical and Scientific Register (K), 26 King St, London, S.W.1, quoting reference D 408/54.A. Closing date 16 Oct, 1954. (N 205)

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NETTLE ACCESSORIES LTD., Harper Rd, Wythenshawe, Manchester, require REPRESENTATIVE for London, South of the Thames and London South Eastern Electricity Board area. Car owner preferred but not essential. Considerable scope. Staff Pension Scheme operative. Apply in strict confidence, giving details of experience, salary required, etc., to the Sales Manager. (N 108)

PLANNING ENGINEER required by the Telephone Manufacturing Co., Ltd., Martell Rd, West Dulwich, S.E.21, with experience of pre-production planning of light electro-mechanical components. Applicants should have reached H.N.C. standard and possess a sound knowledge of production methods. Staff pension and bonus schemes after qualifying period. Five-day week. Apply in writing to Personnel Department. (N 189)

QUALIFIED LIGHTING ENGINEER for overseas Branch is required by large manufacturers. Successful applicants should be capable of preparing lighting specifications, and should be prepared to spend a short period of training in London. Write Box 3837, Electrical Times. (N 198)

REPRESENTATIVE for Electrical Wholesaler (E.W.F.) operating Bedfordshire from local branch. Apply Box No. 3839, Electrical Times. (N 199)

**CHARTERED ELECTRICAL ENGINEER**

required by a large retail organisation of national repute, to advise the Chief Architect to whom he will be directly responsible, on the design, installation and general work concerning the lighting of shops. Previous experience of modern lighting design is essential and a knowledge of heating and ventilating would be an advantage. Age not over 40. Salary £1,500 or higher will be offered according to experience. The post is pensionable.

Applications, by letter only, giving full details of experience should be addressed to: The Secretary, The Professional Engineers Appointments Bureau, 9 Victoria St, Westminster, London, S.W.1. (N 160p)

REPRESENTATIVES (Commission) wanted having live connection with the electrical industry retail and wholesale for unique instantaneous electric water heaters, suitable for domestic and industrial use. Also immersion heaters. Please state area covered and broad particulars of connection. —Box No. 3851, Electrical Times. (N 223)

SALFORD ELECTRICAL INSTRUMENTS Ltd., Times Mill, Heywood, require an ELECTRICAL ENGINEER for experimental and development work on temperature control devices. Graduate preferred but candidate of H.N.C. standard considered. Experience of Work Shop practice is desirable but not essential. Applicants should state age, salary required and give full details of experience. (N 186)

SENIOR EXPERIENCED ELECTRICAL ENGINEERS required for employment by large Oil Company operating in Venezuela, South America. Candidates should be between 30 and 40 years of age, possess a University Degree in Electrical Engineering or A.M.I.E.E. and have approximately 10 years' experience in the operation and maintenance of power houses, H.T. transmission and distribution. They should have already occupied a position of senior administrative responsibility. These vacancies offer a permanent career involving overseas tours of 3 years' duration with 3 months' U.K. leave at the end of each tour. Leaves are fully paid with free passages for employee and family, local leave first and second years. Furnished accommodation supplied for single or married men. Contributory pension scheme covers both employee and family, kit allowance paid. U.S. dollar salaries in line with qualifications and experience, details given at interview. Travelling expenses paid for interview in London. Please write in confidence, stating age, qualifications and full details of experience to Box ZB.66, Deacon's Advertising, 36 Leadenhall St, E.C.3. (N 195)

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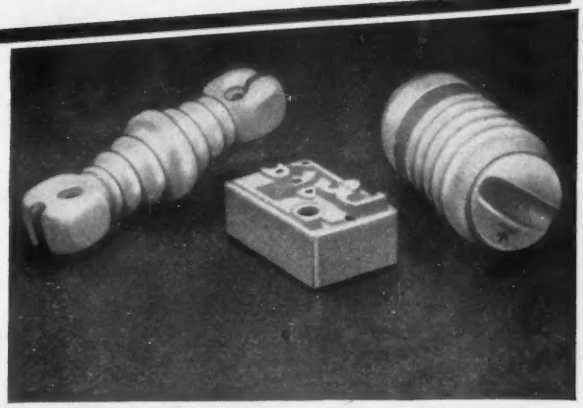

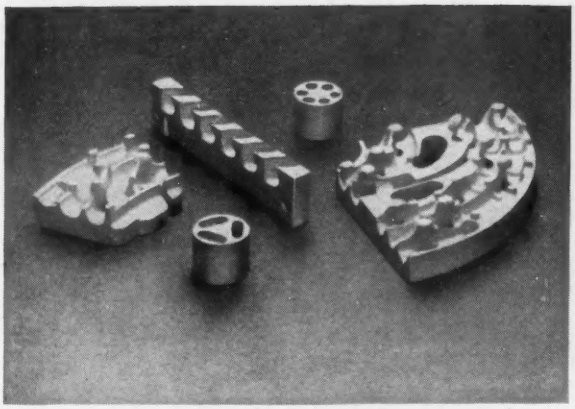

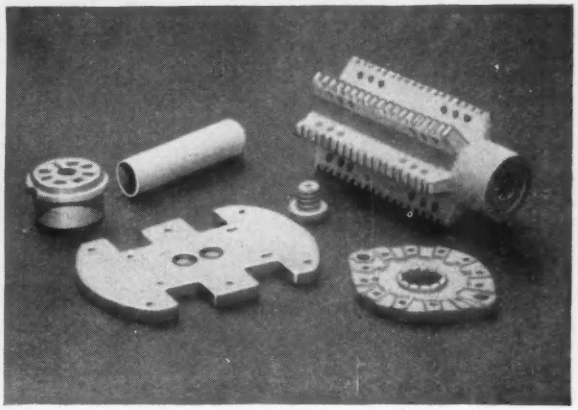

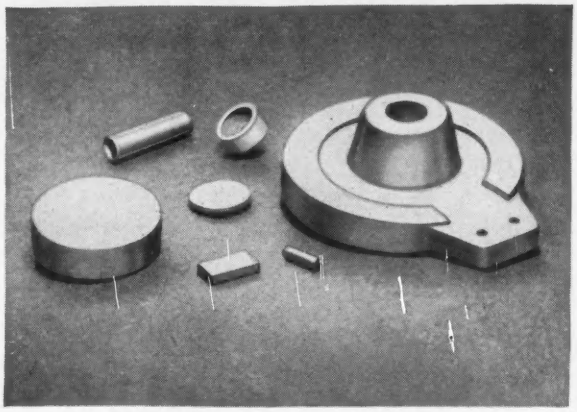

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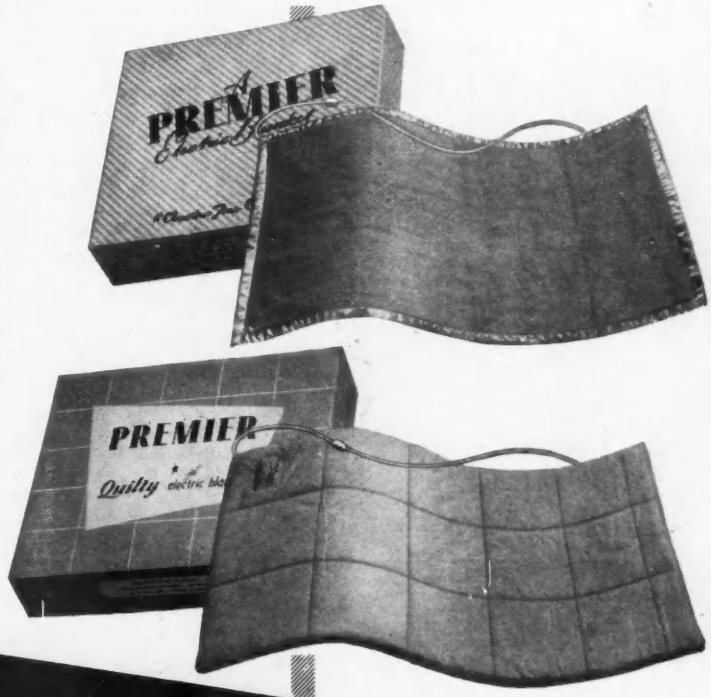


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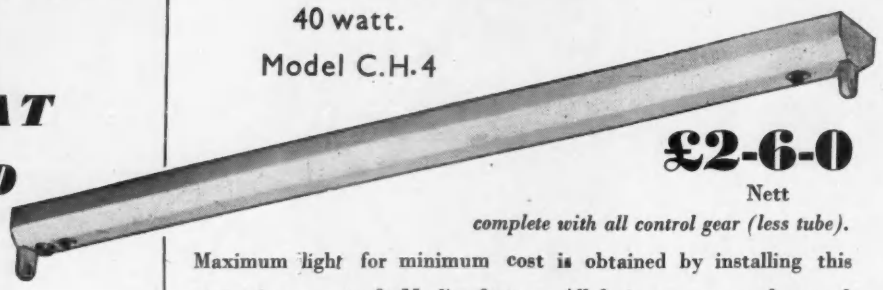

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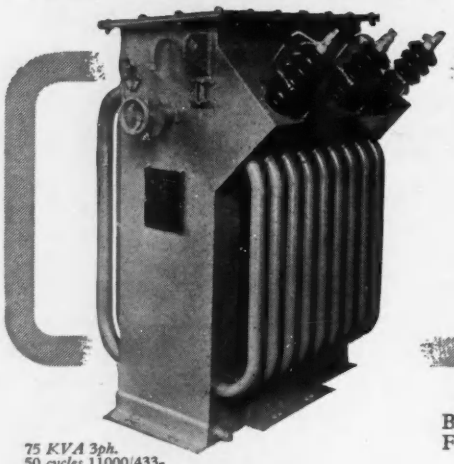

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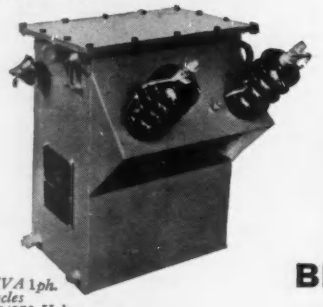

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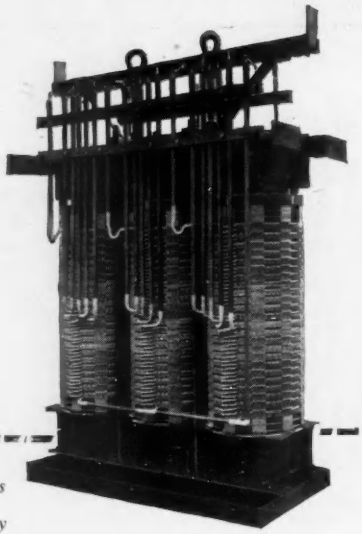

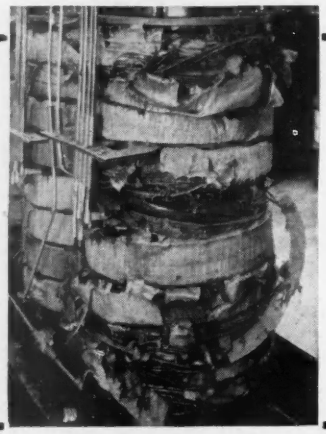

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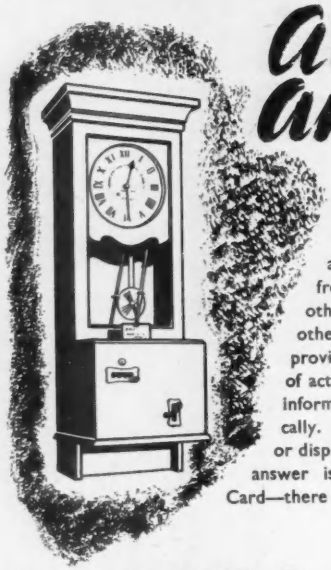

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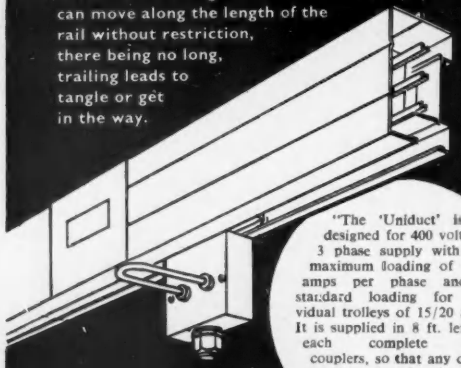

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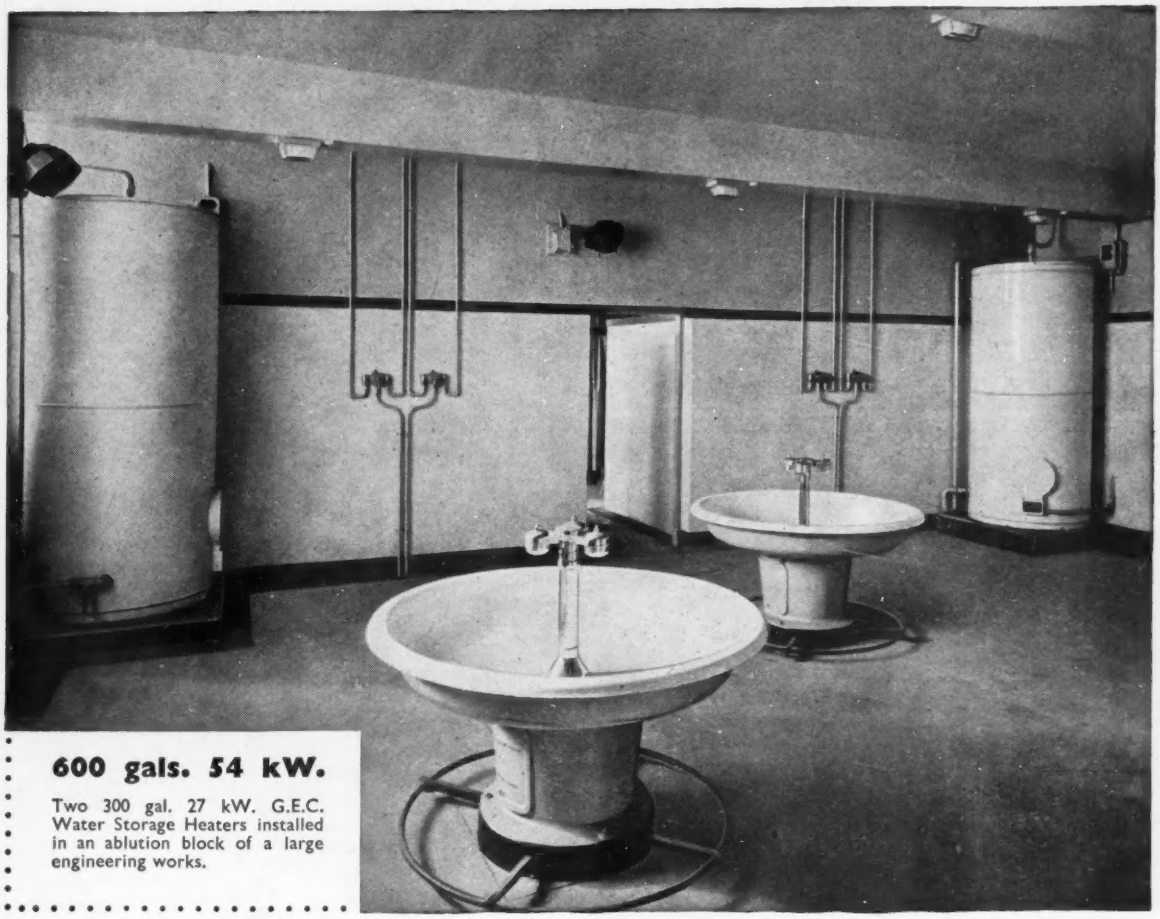

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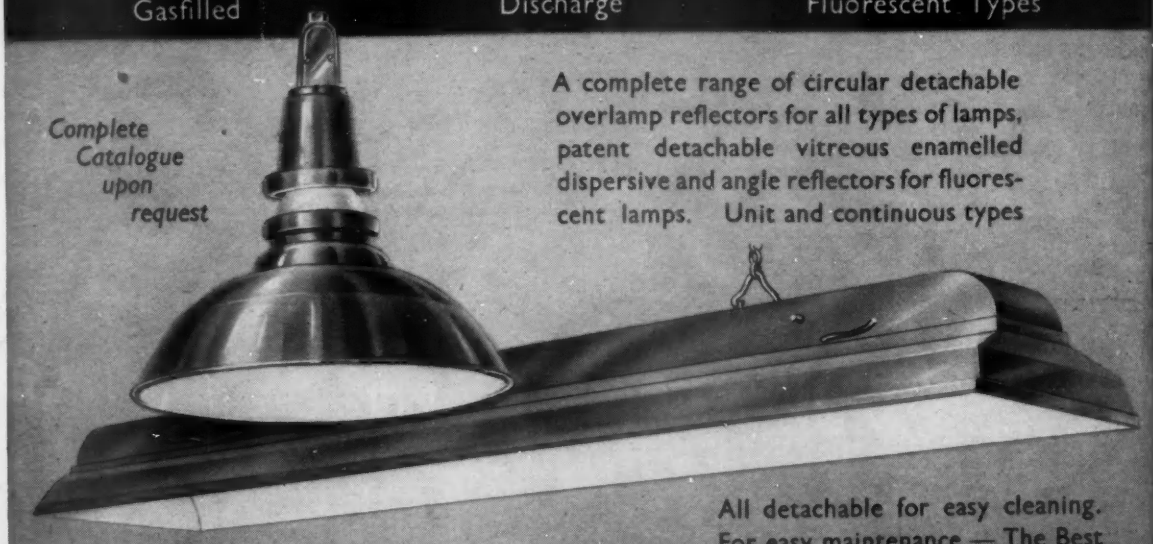

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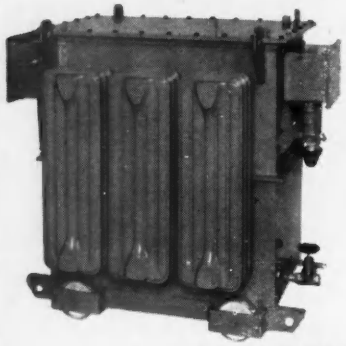

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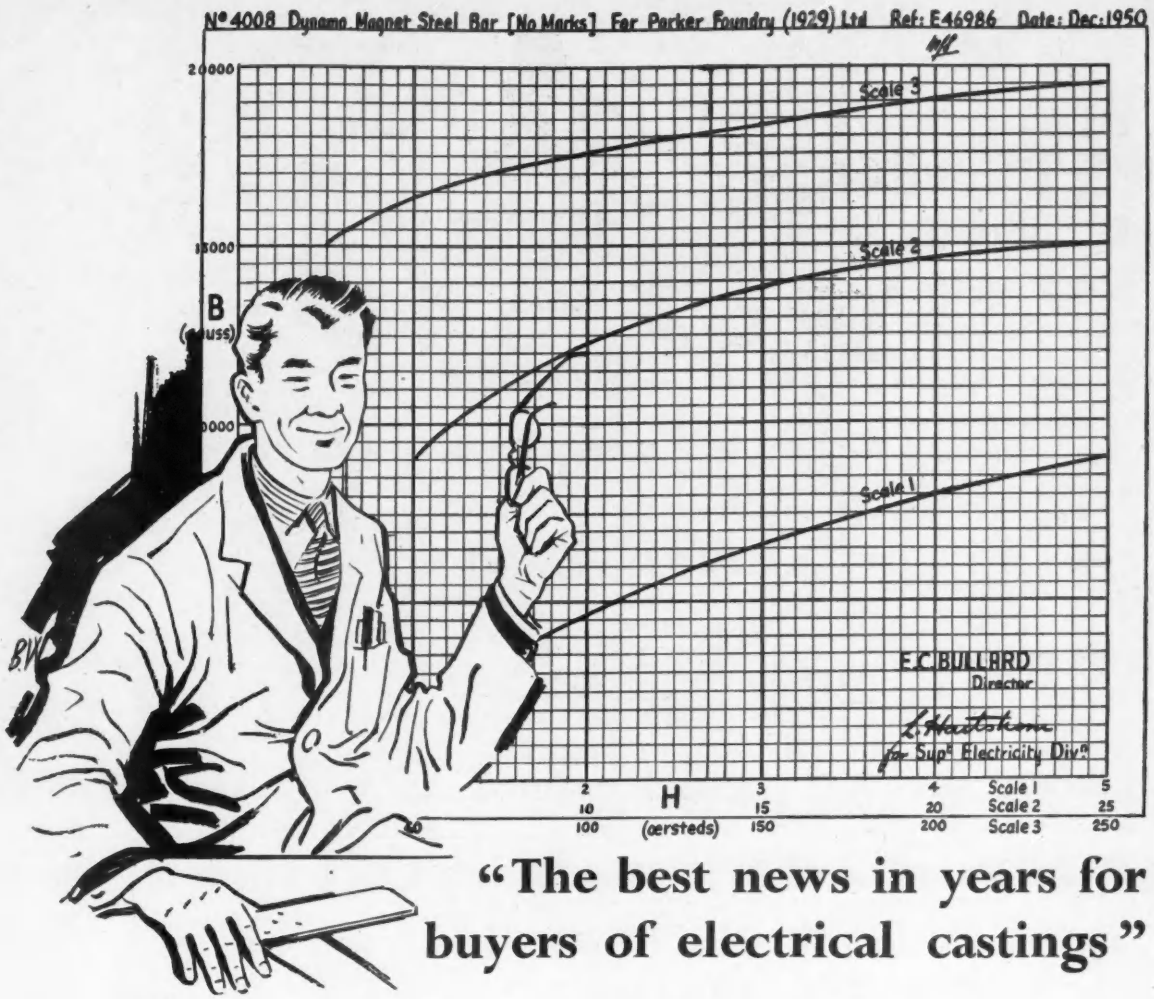


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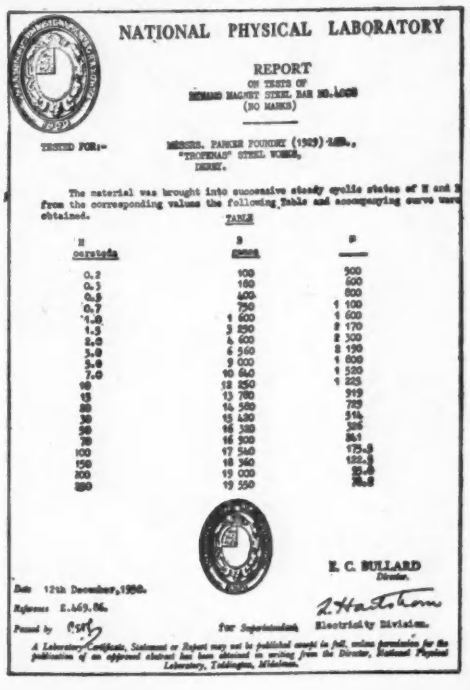

NATIONAL PHYSICAL LABORATORY

REPORT

TESTED FOR:- MESSRS. PARKER FOUNDRY (1929) LTD., "TROPENAS" STEEL WORKS, DERBY.

The material was brought into successive steady cyclic states of H and B from the corresponding values the following Table and accompanying curve were obtained.

TABLE

| H oersteds | B gauss | P |
|---|---|---|
| 0.2 | 900 | 900 |
| 0.3 | 1 180 | 880 |
| 0.5 | 1 650 | 880 |
| 0.7 | 1 750 | 1 100 |
| 1.0 | 2 850 | 1 100 |
| 1.5 | 3 850 | 2 170 |
| 2.0 | 4 920 | 2 320 |
| 3.0 | 6 360 | 3 130 |
| 4.0 | 7 320 | 3 960 |
| 5.0 | 8 220 | 4 320 |
| 7.0 | 9 840 | 4 205 |
| 10 | 11 850 | 5 |
| 12 | 12 350 | 5 |
| 13 | 12 700 | 5 |
| 14 | 12 950 | 5 |
| 15 | 13 150 | 5 |
| 16 | 13 300 | 5 |
| 17 | 13 420 | 5 |
| 18 | 13 520 | 5 |
| 19 | 13 600 | 5 |
| 20 | 13 650 | 5 |

E. C. BULLARD
Director.

Date 12th December, 1950.
Reference E.469.56.
Passed by
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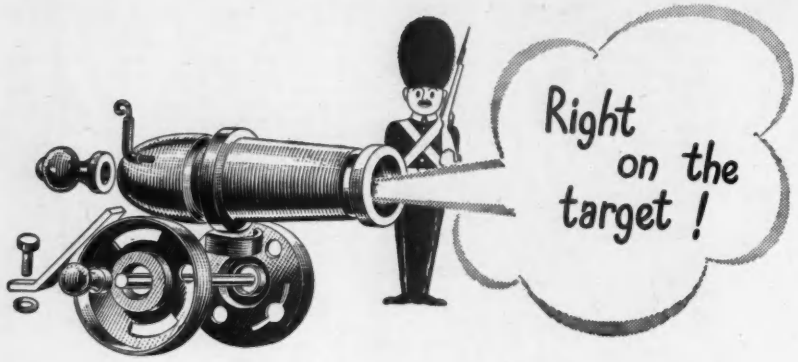


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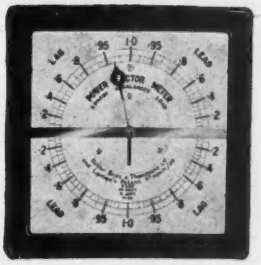
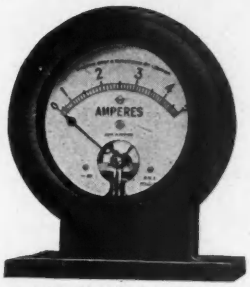


N.C.S. POWER FACTOR METER

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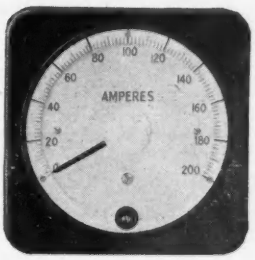
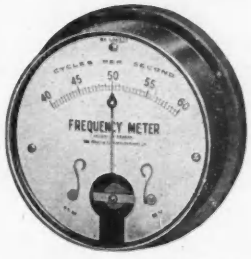



N.C.S. PLATFORM SCALE AMMETER

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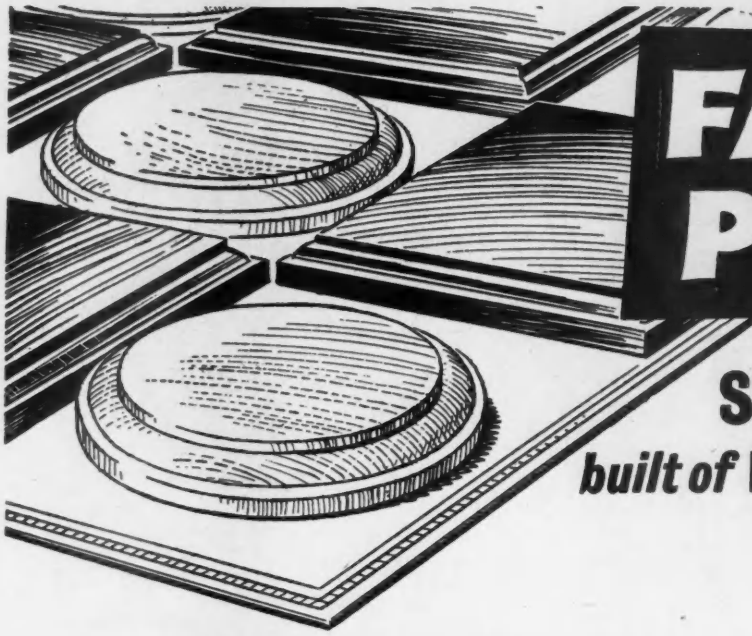

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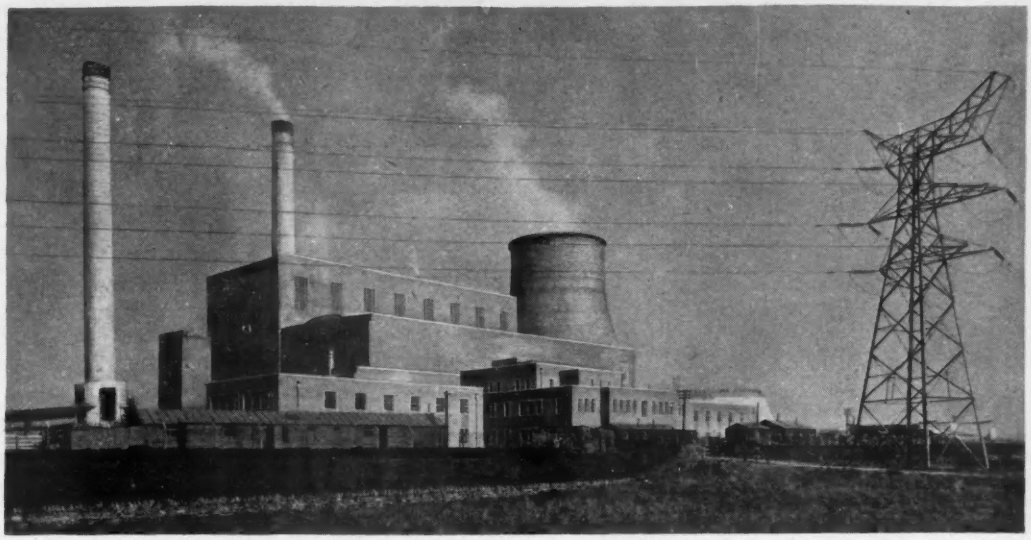
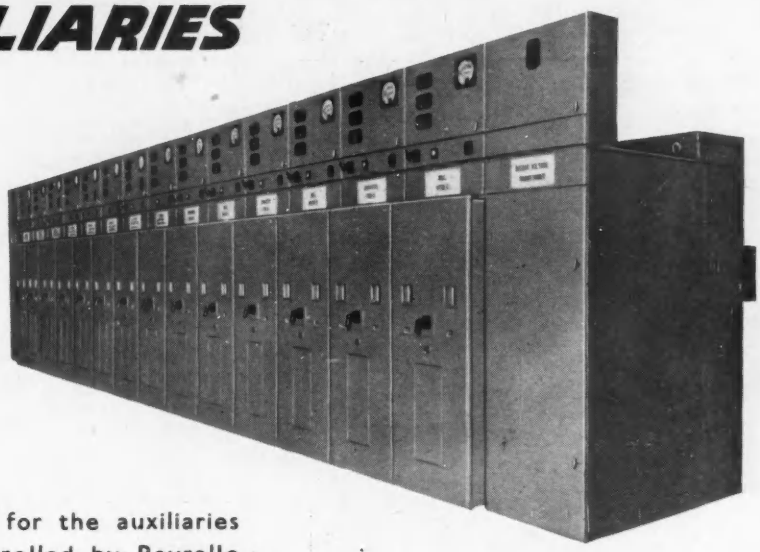


Photograph by courtesy of B.E.A.

# SWITCHGEAR FOR AUXILIARIES



Supplies for the auxiliaries are controlled by Reyrolle class-SA 3,300-volt and 415-volt air-break switchgear

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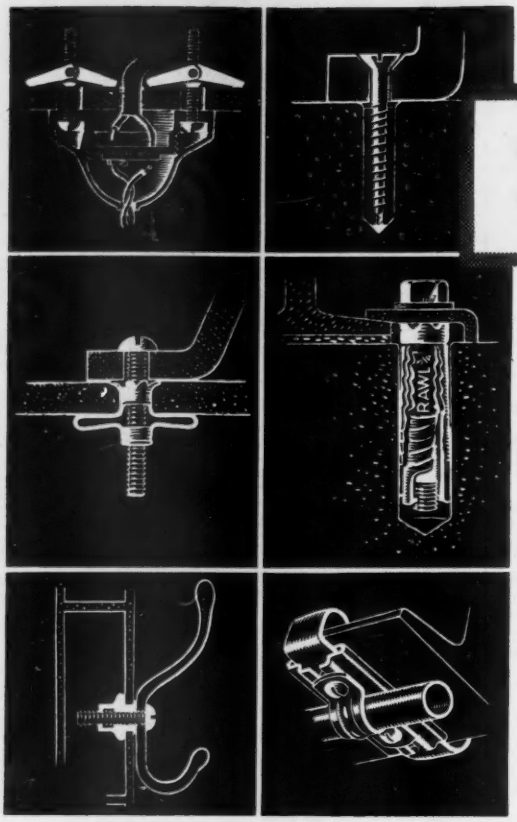

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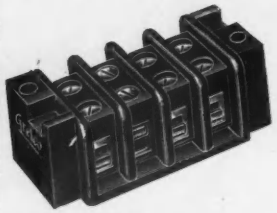

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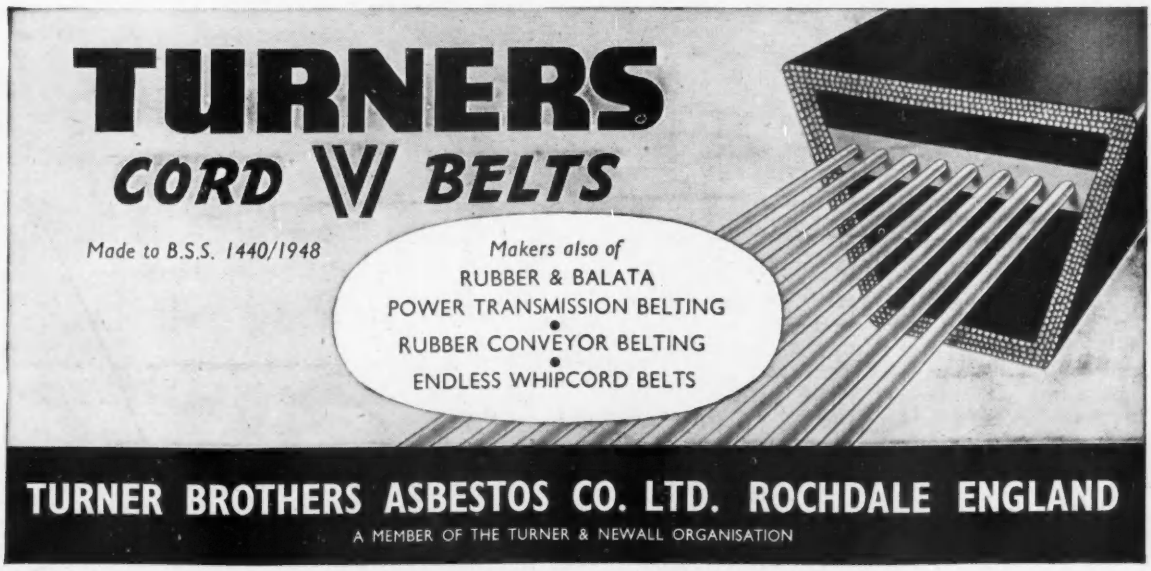


V28

# *Installation Costs CUT-*

New low-priced 40 Watt 4 ft. Ediswan "Unilux" lighting fitting

*Cat. No. LS. 4007*

The unit comprises a tapered channel body fitted with die cast ends. Into the top of the channel portion is fitted a sheet metal ceiling plate carrying the control gear.

The ceiling plate and channel are united by captive screws, the heads of which project on the underside of the channel. The sheet metal is pretreated before being finished glossy white stoved enamel.

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## Fluorescent Lighting Equipment

Publications No. LE.1763 giving complete details of the 4 ft. fitting and LE. 1703 for the 5 ft. fitting available on request. These fittings are offered for use in situations where bare lamps are acceptable. For the Ediswan range of fittings providing various forms of light control ask for Broadsheet No. LE.1788.

**The Edison Swan Electric Co. Ltd., 155 Charing Cross Road, London, W.C.2.**

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LE 187c


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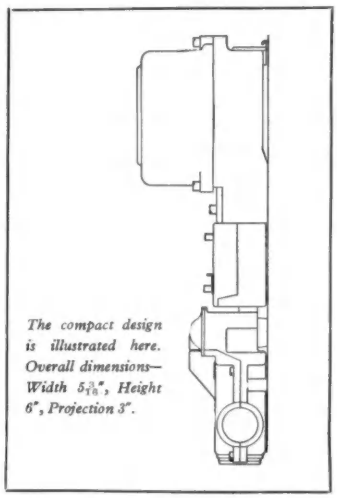
# 60 AMP HOUSE SERVICE FUSE UNIT

## NEW in design

Economy in space and production was the objective in the design of this unique cut-out. This has been achieved by the horizontal disposition of the cartridge fuse link above the sealing chamber, which feature has also led to a perfectly symmetrical shape. The unit is designed to accommodate cartridge fuse links of 60 amp capacity to BS 1361. All current carrying parts are tin or nickel plated, and the base contacts are secured in the mouldings by tapped brass inserts moulded into the base.



*The compact design is illustrated here. Overall dimensions—Width 5 1/16", Height 6", Projection 3".*

## EASIER to install

The fuse with neutral connector is an "all-in-one" unit, having an integral base chamber with the fuse carrier handle covering the fuse and the neutral connector chamber, and a separate cover for the sealing chamber. Full details are given in our List HS3.

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